THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXX. No. 1799.] LONDON, NOVEMBER 2, 1897. [49TH YEAR. PRICE 6d.

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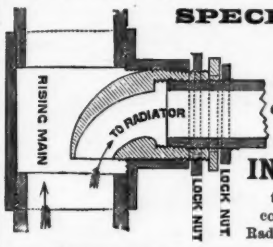

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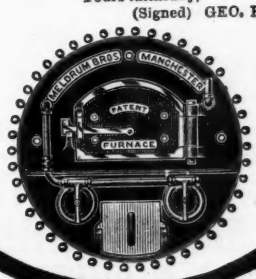

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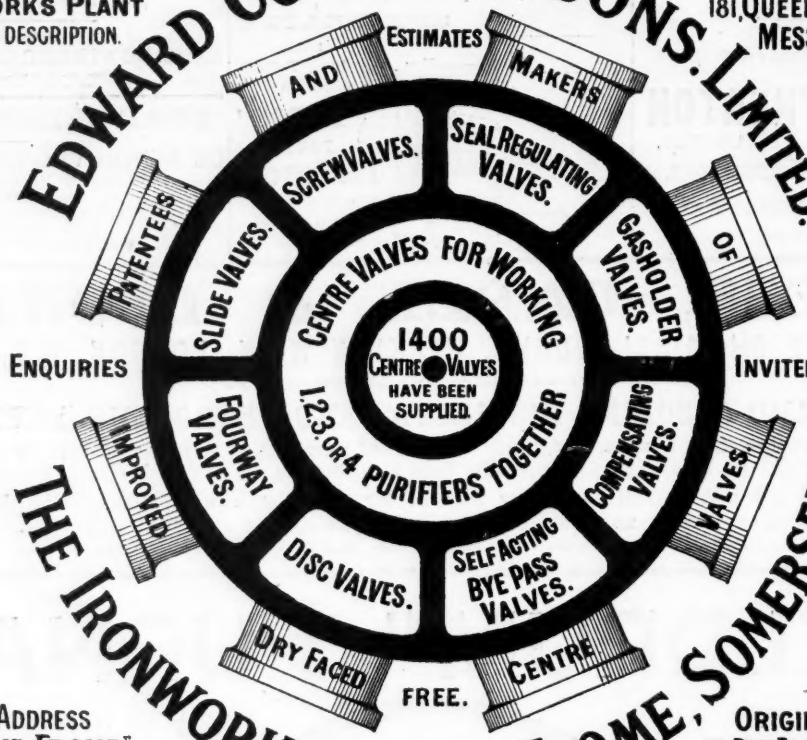

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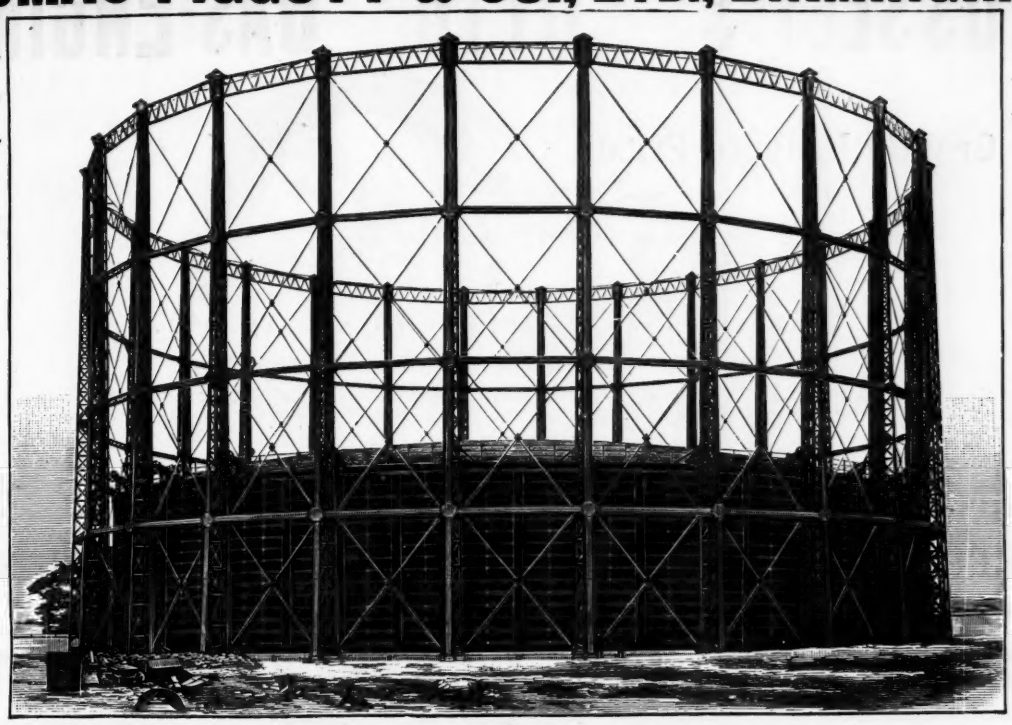

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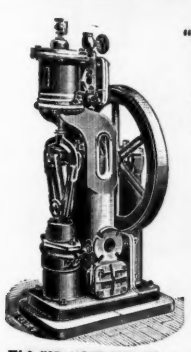

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 868. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

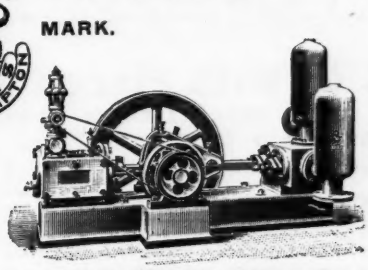

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

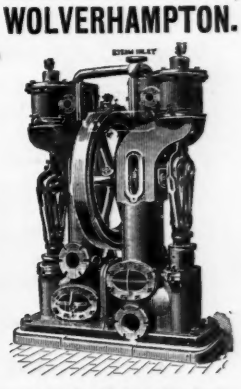

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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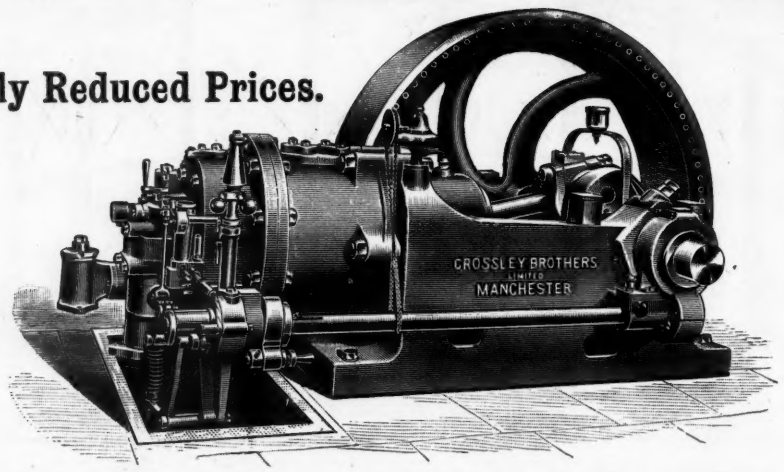

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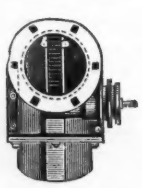

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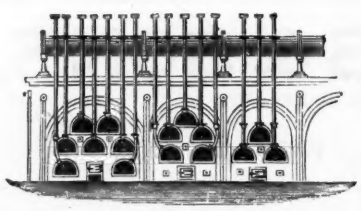

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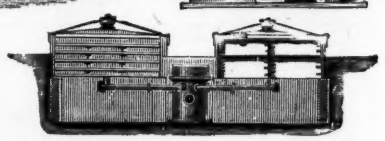

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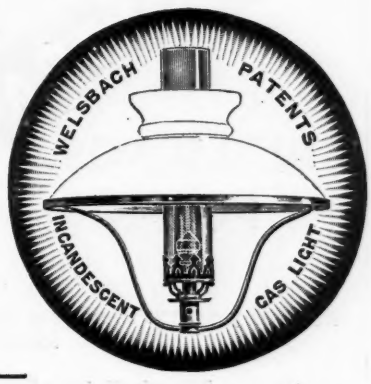

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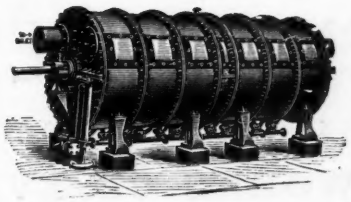

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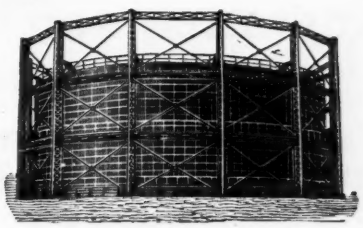

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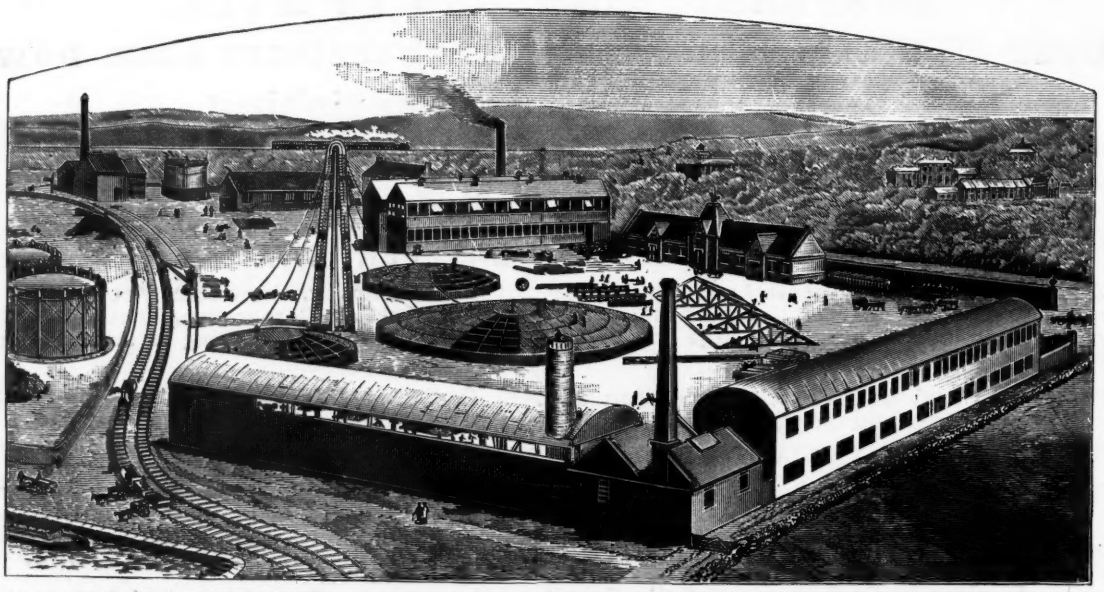

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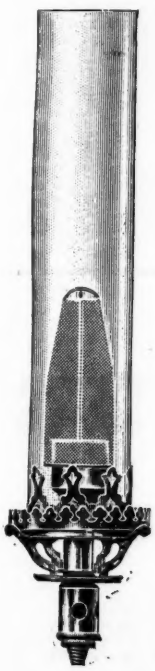

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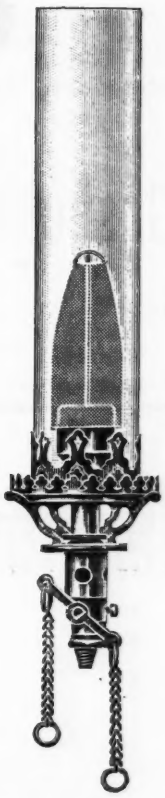

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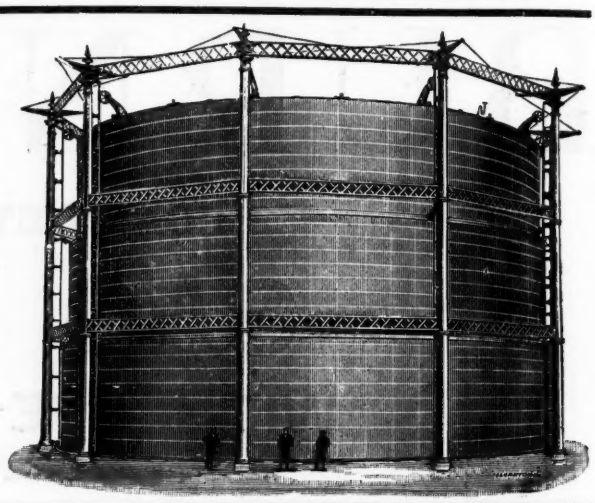

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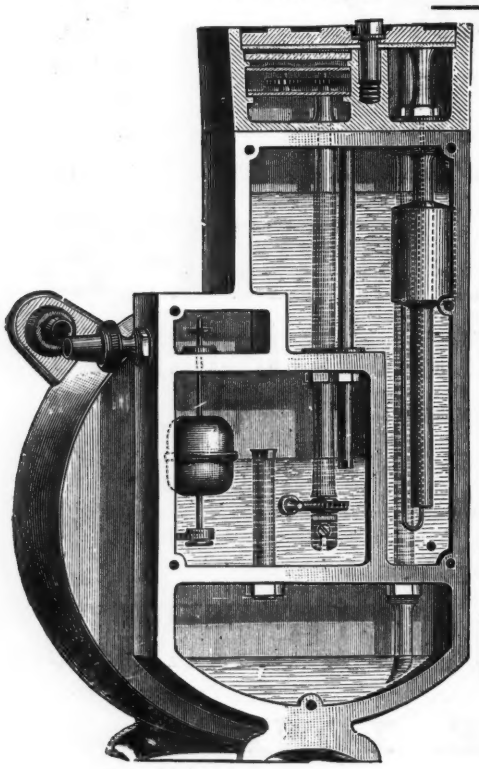

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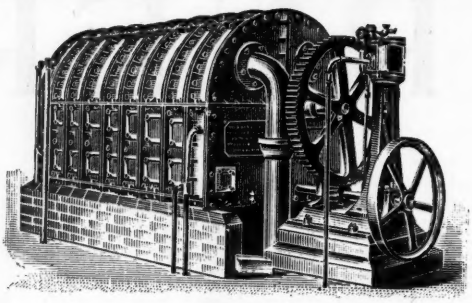

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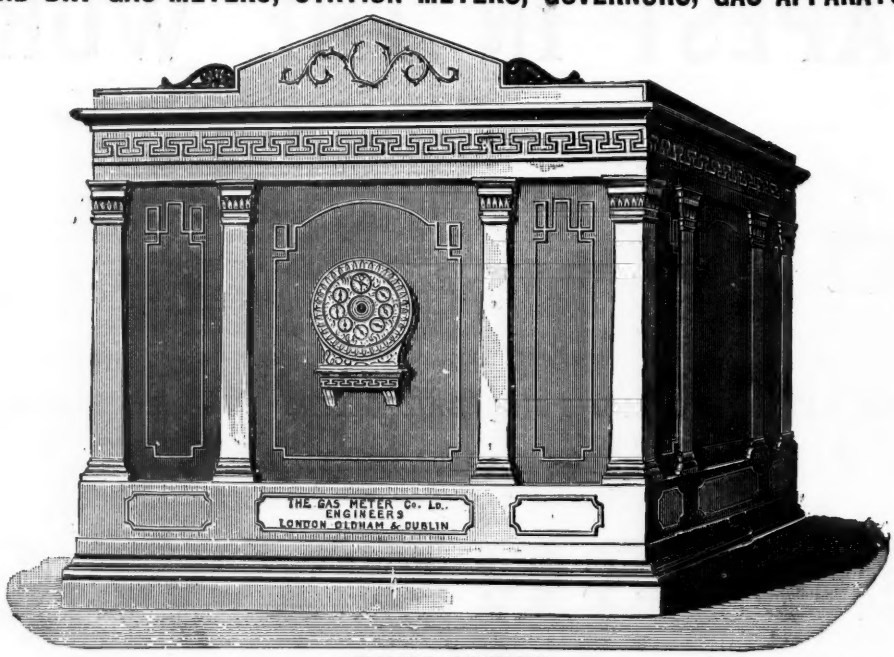

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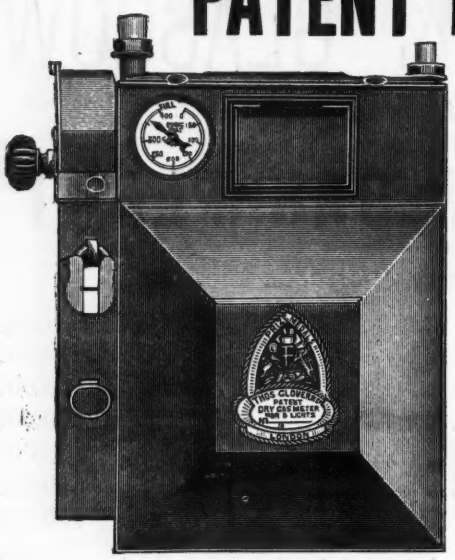

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TO CORRESPONDENTS.

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EDITORIAL NOTES.

The Engineering Strike.

THE event of the week in connection with the engineers' strike is the failure of the conference proposals of the Board of Trade. We gave last week the "rough draft" of what the Department proposed as the bases of negotiation between the contending parties. On Friday, the text of the two replies to this invitation was published. That of the Employers' Federation declared that the employers were prepared to settle the dispute; but they were of opinion that if the basis proposed by the Board of Trade were accepted as drawn, "the relations between "the employers and workmen will practically be the same "as before the stoppage of work, with all the consequent "probabilities of industrial disturbances." The letter goes on to state that the employers could neither reduce the working hours, nor submit to limitations upon the employment of machines. Consequently, they insisted upon the demand for some reduction of hours being unconditionally withdrawn; and at the same time they offered to meet the Joint Committee of the engineering trades who ordered the strike, so as to discuss the questions of interference and machine working. The last paragraph of the letter is as follows: "In view of the persistent misrepre-"sentations which have been put forward during the dis-"pute, the Federated Employers take this opportunity of "again repeating that they have not, and never had, any "desire to encroach upon the reasonable functions of "Trade Unionism, or in any way to interfere with the rights "of combination among workmen." The reply sent by the Executive of the Amalgamated Society of Engineers—the Joint Committee apparently having dropped out of the business—expressed willingness to confer with the employers on the point of interference with working management; required the withdrawal of the lock-out notices to follow the withdrawal of the strike notices; and insisted upon an independent chairman for the conference. These replies were understood to imply a *non possumus* on both sides; but notwithstanding the seemingly uncompromising attitudes of the parties, it was stated on Saturday that the Board of Trade officials have not abandoned all hope of being able to draw up an amended draft of suggestions which they intend to submit to the Executives. It may be hinted that it would be as well if the Department were to try and discover the "Joint Committee" next time, and not treat the Secretary of the A.S.E. as all-powerful in the business.

Thus the matter stands. Meanwhile, the incidental correspondence and news of the week is full of interest. On the one hand, there were the usual run of popularity-hunting politicians and platform performers denouncing the employers for their readily-assumed iniquity in attempting to "smash the Union." Sir H. Campbell-Bannerman was not above piping in this strain at Stirling; and a public "demonstration" was held at Exeter Hall, at which a resolution was passed condemning "the action of the "employers in declining the mediation of the Board of "Trade, thereby rendering themselves solely responsible "for the prolongation" of the dispute. How easily the dispute might have been ended from the men's side was shown by Mr. John Burns, who claimed that "all the "mediation and conciliation and sweet reasonableness "had come from the side of the men." He went on to say that "the present dispute was going to make for direct "employment by the State;" and he expressed a belief that when the parties go into conference, this body "would "give some reparation and indemnity to the men who had "been cruelly and wantonly locked out." This is evidently a sample of what the speaker regards as "sweet "reasonableness."

On Thursday, a long letter by Mr. George Livesey appeared in "The Times," which begins by stating that "the temporary stoppage of a great industry, the distress "of many thousands of families, and the heavy losses of "the employers, great calamity that it is, is as nothing to "the ruin the Trade Unionists would bring on the nation "if the theories that animate them were allowed to pre-"vail." The writer asserts that the engineering employers, upon whom the brunt of the attack has for the moment fallen, are fighting not legitimate Trade Unionism, but Socialism disguised under this name. He establishes his contention by referring to the resolutions of Trade Union

Congresses and quotations from speeches by Mr. Tom Mann, Mr. John Burns, and others. Indeed, these orators have not at any time sought to disguise their idea that Trade Unionism, as they understand it, is Socialism and nothing else. Mr. Livesey proceeds to show that it is the men inspired with this idea who are engineering the present strike, and would get up a railway men's strike to-morrow if they could. Naturally, Mr. Livesey proposes that the opportunity should be taken for generally introducing a system of profit-sharing in the engineering trade, with a view to giving the workmen a property in their employment which would render them proof against the blandishments of out-at-elbows Socialists.

Mr. J. Stephen Jeans had a letter in "The Times" on Friday to show how the British engineering trade is suffering from foreign competition; and on Saturday the same journal devoted several columns to an interesting mass of matter bearing in various ways upon the dispute. There is among other things some correspondence between the head of a ship-repairing firm which has reverted to the nine-hour day, and the representative of the Trade Unionists in the firm's employ, which makes instructive reading. The conclusion of the employer's letter is as follows: "The masters have been forced into combination "by the Societies having for many years acted up to their "mistaken notions as to what is best for the men. These "Societies do not appreciate the difficulties, anxieties, and "expenses masters have to contend with; and masters "have a right to their own opinions as well as the men, "and men should not abuse them for acting thereon." In the same issue, Mr. Arthur B. Markham, of Chesterfield, makes a sledge-hammer onslaught upon the methods of the A.S.E. The nature of his charges may be inferred from the following passage: "When Trade Unions ". . . dictate to employers regarding details of manage-"ment in their works; when they declare themselves "arbiters of the fitness or unfitness of particular men to "do particular work; when they bind their members into "classes as rigid and hopeless as a Hindu caste; finally, "when they seek to deprive a man of the fruits of his labour "by decreeing that the sober and industrious shall earn no "more than the drunken, thriftless, and worthless—when "matters have come to this point, it is high time for the "employers, not altogether for their own sake, but also for "that of the great majority of men in this country who are "not Trade Unionists, to make a firm stand against further "encroachment of this despotism." Mr. Markham also agrees with Mr. Livesey that the present leaders of the men are not Trade Unionists at all but Socialists pure and simple. Another writer draws attention to the undue preponderance of the professional Trade Union official element in the Labour Department of the Board of Trade, as constituting a reason why the employers might hesitate to accept the invitation of the Department to enter into a friendly conference with the leaders of the A.S.E., "who "ever since the commencement of the strike have taken "every possible opportunity of abusing and misrepresenting "them." Thus the campaign goes on towards the inevitable finish—every day strengthening the employers' position, and rendering that of the strikers more desperate. Victory must rest with the side that can wait the longer; and it is obvious where this advantage lies.

Some Views of Street Lighting.

It appears from a published report that a deputation of the Manchester Electricity Committee have come back from a Continental tour possessed with the notion that the ideal street lighting consists of electric arc lamps slung along the middle line of the roadway from span wires stretched across the streets. This curious opinion is dealt with in our "Electric Lighting Memoranda" to-day; but we desire to mention the subject here with the object of drawing attention to the hap-hazard way in which members of our English local authorities treat matters of the kind. On the face of it, one might suppose that a question of how the streets of an important city ought to be lighted would be opened up systematically, if there were supposed to be anything imperfect or doubtful about the practice, by somebody qualified to elucidate the matter. The business is serious enough to call for the most expert treatment, whether it is regarded from the point of view of the cost of the service, or the appearance and safety of the streets after nightfall. It is not too much to say that a bulky volume has been written about the street lighting of Paris, for example, where the service is performed with the most particular care, and in a truly scientific spirit. As for Manchester—well, Mr. Alderman Higginbottom, Mr. Councillor John Phythian, and Mr. C. H. Wordingham, the City Electrician, have been on a Continental tour. They made the discovery in the course of their travels that, "where possible, the various cities were adopting arc "lamps in the centre of the streets, suspended by means "of cross-span wires fixed by rosettes to the buildings "on each side, or from span wires fixed from vertical "posts on each side of the street." Consequently, they forthwith recommend Manchester to go and do likewise! Would it be regarded as rudeness to these enthusiastic tourists to hint that the conclusion is scarcely warranted by the premises in this startling proposition?

Whether the streets of Manchester are lit by electricity or gas, there are elementary conditions to be recognized and conformed to which might be deemed obvious were it not that their very existence has apparently been ignored by these errant Manchester amateurs. Apart altogether from the usually accepted rule that a public thoroughfare should be open to all possible traffic, the manner in which the street-lamps should be disposed varies with circumstances; but not without rule. It is no more possible to say reasonably that all streets should be lit from the middle of the road than that they should always have the lamps fixed on wall-brackets by the side of it. There are plenty of beautiful examples of wall-brackets for street-lamps in old Continental cities. There is one famous work of art of the kind in Florence, on a salient angle of the Pitti Palace, which has served as the model for such fittings for the last three hundred years and more. But because this is so, shall we not have a "refuge" light in the middle of the street, where it is needed? One thing may be noticed—that truly "overhead" lights in public thoroughfares are the rarest arrangement of all. Where there is a central line of lamps—as, for example, in the Euston Road, London—the line really divides two parallel streams of traffic, and is no more "overhead" lighting than it would be if the lamp-columns were in the lines of the kerbs. If a roadway is bordered by foot pavements, the "greatest "happiness of the greatest number" is far better secured by kerb lighting than by lighting either from the centre of the road or from wall-brackets. Hence it is not caprice that has put the vast majority of street-lamps in this position. Some few "faddy" persons, like Mr. W. H. Preece, have argued in favour of central overhead street lighting; but they have only been able to take this view by forgetting the needs of the side walk, and setting at naught the necessities of the drivers of vehicles. What carman or omnibus driver, set up on high as he is, would not rather have the street lights on one or both sides, than right in front of him? It would, of course, be possible to go into this matter at much greater length; but enough has been said to prove that the problem of good street lighting is not to be solved by the meagre information to be picked up during a trip to certain European towns.

"The Spider and the Fly"—Chancery Lane "Patent Offices."

A law case that was reported in last Saturday's newspapers once more calls attention to a crying evil—not precisely of the British patent system, but of that system of agency which has grown up round it. The case is a very simple and ordinary one. A gentleman living in the country, an assistant master at one of the great public schools—and a music master at that—had an invention which he was desirous of patenting. He was not altogether a novice in such matters, having before obtained provisional protection for something else through a certain patent agent, whose name he remembered, but not his address. This information he thought to obtain for himself at the Patent Office, which he rightly believed to exist somewhere in the purlieus of Chancery Lane. Arriving in due course at the Holborn end of this historic thoroughfare, the would-be patentee asked a policeman where he should find the Patent Office. This active and intelligent officer pointed out to him the first patent agent's sign that happened to be in sight down the Lane, which bore the inscription "Patent Office." Nearer inspection revealed also "a shield, hanging from a support, bearing the words "'Patent Office' and a representation of a crown, and "in large block letters on a white ground the words "'Patents, Designs, and Trade Marks Office.'" Believing this establishment to be *the* Patent Office, the inquirer

entered; and before he came out again he had engaged to pay £350 for the purpose of patenting his invention in England and all over the world, "excluding Australia." Not having so much money at his bankers, the gentleman paid £200 down, and then took steps to sell stock for raising the balance. At this point of the story, he seems to have discovered, for the first time, that he had not been dealing with a Government Office; and thereupon he consulted his Solicitors, who endeavoured (of course, too late) to stop the cashing of the cheque. Matters were not so bad as they might have been, however; for the payees had only drawn out £53 of the money. An interim order was promptly obtained from the Vacation Judge, restraining the payees and the bank from dealing with the balance; and this order was continued on Friday by Mr. Justice Romer, who ordered the money to be paid into Court pending the trial of the action that has been commenced by the drawer for the recovery of his original payment. The plaintiff was fortunate in coming before so strong a Judge; for it must be confessed that his story was of a nature to illustrate a very rude old proverb, and the law was not altogether clear on the point. Public interest in the case turns wholly upon the way in which the plaintiff says he was deluded into taking a patent agent's office for *the* Patent Office. The tale is perfectly credible. The Government Office is more like an old prison building carefully hidden away from the busy haunts of men than the establishment it really is; and many of the Chancery Lane patent agents are far more impressively housed. How is a stranger to know his way about in these circumstances, so disgraceful to our Government? It does seem plain to the "man in the street," however, that if it is an offence to use the Royal Arms without a warrant—a practice which it is difficult to believe ever harmed anybody—some legal remedy might be found for pretences such as that to which certain Chancery Lane patent agents are addicted.

The Evil of Private Bill Legislation.

THERE has been some further correspondence in "The "Times" on the subject of the reform of Irish Private Bill Legislation. This is a good example of that large and important class of subjects of public interest which seem to cry aloud for reform, in regard to which the way of reform appears obvious, and yet upon closer examination indicate that the obvious is not quite so certainly the right way as it looked at the first glance. Mr. Arthur W. Samuels appears to have right upon his side when he declares that "the citizens of nearly every city and town in Ireland "have bitter reason to complain of the enormous burdens "imposed on their local rates through having to conduct "Irish Private Bill litigation at Westminster." It does seem monstrous, as he says, that the costs of the recent Bills, abortive or successful, relating to the water supply of Dublin and its surrounding townships should have amounted during the last two or three years to £30,000. Such waste of money clamours for instant stoppage; but we venture to observe that it need never have taken place. Doubtless it is expensive to fight Private Bills at Westminster. But who is responsible for the fighting? Not the "Westminster clique," charged by Mr. Samuels with the nefarious practice of tripping up all schemes of reform of Irish and Scotch Private Bill procedure, but those who by their own action have turned, as he admits, legislation into "litigation." This single word explains the whole mischief. It is distinctly misleading—though Mr. Samuels probably does not intend to mislead—to refer to the cost of the Dublin Water Bills without also noticing the circumstances that caused some of them to be abortive, and all of them ruinously expensive. If all concerned had only acted straightforwardly and honestly—if the Dublin Corporation had kept out of their legislative schemes both political aims and attacks upon vested interests—they would not have squandered the ratepayers' money as they did. Trouble of the same kind is not confined to Irish business, as witness the scandal of the St. Anne's-on-the-Sea Gas Purchase Bill of the past session. Wherever Private Bill procedure is sought to be made to subserve marauding schemes, there certainly will fighting occur, and there will the eagles be gathered together. It is idle to think of getting rid of the "West-"minster clique," unless the class of business by which these much-abused gentlemen live is abandoned; and this is not their affair. Men when attacked will always defend themselves; and there is nothing to be gained by changing the venue. Reform Private Bill procedure by all means; the "Westminster clique" will not object to the operation. It does not matter to them whether they are retained to appear before an Irish judge, Scotch "fiscal," or Westminster committee. But if those people who seek legislative facilities would only drop the litigious aspect of their operations, they might attain their ends cheaply enough, even at Westminster.

Sulphate of Ammonia as a Fertilizer for Turnips.—The judging in the turnip-growing competition for prizes offered by Messrs. J. Ross and Co., of the Lime Wharf Chemical Works, Falkirk, has been completed. The firm offered £10 as premiums for turnips grown with manure of which sulphate of ammonia formed part, and to which no nitrate of soda had been applied, either by itself or in the form of a compound. The amount was divided into three prizes for Swedish, and three for yellow turnips. Competition in both classes was very close; some of the prize lots of Swedish weighing 25 to 27 tons per acre, and some of the yellow 28 to 31 tons per acre.

Societe Technique du Gaz en France.—We have received the volume of Transactions of this Society for the present year. It contains the report of the proceedings at the 24th annual congress, held in Paris on the 15th and 16th of June, as well as at the social functions connected therewith. The technical matter, which, together with the address of the President (M. Ph. Delahaye) has, for the most part, been noticed in the "JOURNAL," is illustrated by diagrams in the text and by ten large plates. The rules of the Society and the lists of members are given as usual. M. Victor Delahaye continues his review of the legal proceedings connected with the gas industry in the year 1895-6; and this is followed by a list of the cases dealt with in preceding volumes, going back to 1884.

Beacon and Buoy Lighting by Petroleum.—The use of compressed gas for lighting beacons and buoys has been attended with unquestionably beneficial results to the mariner; but, excellent as the system is, it is found to be costly, owing to the necessity for employing compressing machinery and somewhat complicated appliances. This drawback caused Mr. John R. Wigham, of Dublin, who is well known in connection with his arrangement of superposed gas-burners for lighthouse illumination, to turn his attention to the matter; and the result has been the introduction of a system of petroleum lighting which has been found to give much satisfaction. It has been tried not only in comparatively calm waters, but in the most exposed positions, where the action of rough seas keeps the buoys in constant, and often violent, motion. The points of excellence claimed for the petroleum lamps are that their illuminating power is greater than that of compressed gas; that the light produced continues to shine for weeks in succession without any attention whatever; and that for its maintenance no machinery of any kind is required, while the expense under this head is limited to the cost of the oil—amounting in some cases to the small sum of 1d. per day of 24 hours. The outlay in the first instance is confined to the cost of the lamp and fixing it to the buoy.

Cupping of Telescopic Gasholders.—It is a well-known fact that, when the cup of a telescopic holder which is delivering gas enters the water in the tank, gas becomes confined in the dip of the outer lift; and as the holder falls further, a considerable difference between the pressure of this confined gas and that in the bell of the holder supervenes. Several troubles frequently arise from this difference of pressure. The confined gas deteriorates in quality; water is expelled from the cup when the lift next rises, and the depth of the seal is thus lessened; and under certain conditions a violent expulsion of gas from the dip takes place as the lift uncups. Experiments with a view to discovering a means of avoiding these troubles were made on a three-lift holder, provided the Intze system of rope guides, at the gas-works at Bautzen, in Saxony. The upper lift threw a pressure of 3·6 inches, and the whole of the lifts a pressure of 9·8 inches. During the descent of the holder, as the innermost lift became partially ungripped, it was observed that the levels of the water in the bell, in the cup on the two sides of the dip, and outside the cup, were not alike in any two of these four cases. At a particular point in the descent of the holder, it was noticed that gas must be expelled from the dip through the cup as soon as the innermost lift had fallen by 2·4 inches. To prevent violent expulsion of the gas in such a case, Herr Behn, the Manager of the Bautzen works, conceived the plan of connecting the dip of each lift with the bell by means of an arrangement of pipes similar to that used in steaming the cups in frosty weather. This device served the purpose of equalizing the pressure of gas in the dip and the bell when the cup became immersed in the tank. In many cases, the same result might be more simply achieved by connecting the dips with the inlet-main of the holder. The pipes used at Bautzen were 2 inches wide internally. The arrangement was described by Herr R. Bergfeld, of Berlin, in a recent number of the "Journal für Gasbeleuchtung;" and diagrams were given showing the levels of the water in the cup and tank with and without the pipes for equalizing the pressure. The device has been patented in Germany.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 960.)

THE Stock Exchange had another quiet period last week—quite as quiet as its predecessor. Business as a rule was not good until quite towards the end. Markets were either weak or hesitating; and there was a disposition to realize. The fear of a rise in money acted as a deterrent to free buying; and numerous other considerations exercised a depressing effect—viz., Indian affairs, American affairs, South African affairs, and the strike at home. But things took a better turn before the close. Money was in good demand for the Stock Exchange settlement and general purposes; and loans commanded advanced rates. Business in Gas securities was only very moderate, taken all round; and quotations for the most part remain without variation. The general tendency continues firm, with one conspicuous exception. This is Gaslight "A," a good deal of which (understood to belong to executors who had to realize) was put into the market, and naturally caused an abatement of price. The best price of the week was 315 on Monday, from which it gradually fell away until it was done at no better than 309—the quotation showing a loss of four points. The secured issues, however, were quite unaffected, and kept their figures up well with fairly active business done in them. Transactions in South Metropolitan were about a moderate average; and the price was very steady and even all through the week. Commercials were exceedingly quiet and firm; the few parcels of stock which had come into the market being quickly snapped up. There was more business done in the Suburban and Provincial Companies than they generally command; and the prices of everything touched were well up to the mark. Very little change, however, took place. Brentford new gained a couple of points; but Alliance fell back slightly, though no business was marked in it. The Continental division was strong throughout; Imperial being very firm and steady, while Union gained a point. Among the rest, there was nothing calling for special remark; and the only change was a little set-back in Cape Town. The Water Companies were all very buoyant and strong, though transactions were not really numerous. Nearly all of them improved upon their figures of the preceding week; Lambeth taking the lead, in view of their further advance to their maximum dividend of 10 per cent.

The daily operations were: Business in Gas on Monday was mostly in Gaslights; the "A" stock at once exhibiting a weak tendency, and receding 1. But Brentford new rose 2; and Continental Union, 1. In Water, Lambeth advanced 2. Tuesday's Gas business was more evenly distributed through the list. Gaslight "A" receded 1; and Cape Town, ½. On Wednesday, Gaslight "A" again came in for most attention, and closed two points weaker. In Water, Lambeth tens rose 3; and ditto 7½ per cent., 2. Gas issues were all steady and unchanged on Thursday. In Water, Lambeth improved 3; Grand Junction, 1½; and East London, 1. Business fell quieter on Friday; and the only move was a drop of ½ in Alliance and Dublin. In Water, West Middlesex rose 3; and Southwark, 1. Saturday was very quiet, in view of the usual holiday on Monday.

ELECTRIC LIGHTING MEMORANDA.

A Manchester Report on Continental Electric Supply Systems—An Assent and a Criticism—A United Undertaking—A Blunder.

A REPORT on Continental methods of electric lighting and traction has been presented to the Corporation of Manchester by the members of a deputation recently despatched on a tour of inspection through the principal European capitals. The report bears the signatures of the Chairman and Deputy-Chairman of the Electricity Committee, and of Mr. C. H. Wordingham, the City Electrical Engineer; and it is consequently to be treated with respect on this account. The object of the inspection was to ascertain the latest Continental practice in electric lighting, and to learn how far electric traction is in use, "and especially, if possible, to ascertain how the problem of supplying current for both lighting and traction was dealt with." As a matter of fact, the report says only a few words respecting methods of generating electricity. The deputation were much impressed with the workmanship and design of the engines and other central station appliances; and they appear to have accepted without any difficulty the Continental pattern as a standard of excellence. This is as it may be. But the result does not logically flow from the terms of the reference, and there is some weight in the comment of the "Electrician" upon the report, that the deputation were "gone" on their Continental models to the exclusion of some quite pertinent qualifying considerations. If the Manchester deputation fell in love with Continental electric lighting and central station practice, they became absolutely infatuated with what they saw of electric traction abroad. They declare that "one result of the investigation is to show that electric traction is fast superseding all other means of hauling trams. Wherever electric traction has been introduced on a small scale, the system is being largely extended, and the use of horses is being entirely abandoned. Electric traction is not only preferred to horse traction, but to all other forms of mechanical propulsion, even the Serpollet steam system in use in Paris, which appeared so promising, is being abandoned in favour of the electric system."

This judgment is in the main correct. There is no question that electric trams are spreading fast over the Continent. Also, in passing in review the different systems of electric tramway working, the deputation are fairly justified in concluding that "the overhead trolley system is by far the cheapest to construct, costs less for maintenance than any other system, is the simplest to operate, and the most easily repaired." The combination of an accumulator system, for use where there are no wires, with the overhead trolley system, is recognized as convenient, but criticized as expensive, "on account of the great weight of the batteries having to be hauled over the whole of the lines, whether the accumulators are furnishing current or not." The imputation of costliness is probably deserved; but it may perhaps be attributed to a slightly different cause from that assigned to it by the deputation. However, all this is fair enough; and we agree with the "Electrician" that it was "almost inevitable" that the deputation should acquire a good opinion of the trolley system, and that they should recommend its use on Manchester tramways. Where the opportunity for criticism comes, however, is in regard to the statement of the deputation "that the overhead trolley system with span wires attached to posts fixed along the sides of the streets is the most suitable for Manchester." Our electrical contemporary argues with great force that the span-wire system here recommended is both ugly and old-fashioned, and opines that the streets of Manchester will present a sorry sight if the recommendation is acted upon. The central combination lamp and wire post is declared to be far preferable for all except the narrowest of thoroughfares; and our contemporary asks whether the travellers from Manchester have seen how the thing is done in Bristol and Leeds.

Upon the remaining question, as to the expediency of combining in one undertaking the supply of electricity for lighting and traction, the deputation are strongly of the affirmative opinion. The following reasons are given for this judgment: "In the first place, the traction load is one extending over long hours, and the machinery used for the production of current for this purpose can be looked after by the same men who must of necessity be in attendance ready to run the lighting plant if required. Further than this, by combining the two stations, there need not be so many machines held in reserve, since the reserve machines can be common to the two systems; it being extremely improbable that there would be a breakdown on the lighting and traction machines at the same time. This remark applies also to the boilers; and another very large source of economy arises from the fact that the loss from radiation from the steam-pipes can be very greatly reduced by supplying both sets of engines from the same steam range. This economy may not at first sight appear important; but, as a matter of fact, the loss from radiation from steam-pipes is extremely large, and this alone would warrant the combination of the two stations. Other sources of economy are management and saving of land by the concentration of the plant." Apart from the somewhat petty consideration of the steam-pipes, there is no fault to be found with this conclusion, which is indeed obvious. If Manchester is going in for electric trams and electric lighting, to be supplied by the Corporation, then, of course, the work should be confided to one undertaking, which should treat both applications fairly in the apportionment of working expenses.

It is hardly credible, however, that the deputation should have committed themselves to "span wires," not only for supporting trolley wires, but also for hanging arc lamps in the centre line of streets. Yet this is what they have actually done. "In the streets where there are no tram lines, the arc lamps are to be suspended in the centre of the streets, and carried by span wires. These span wires to be fixed by rosettes to the sides of the buildings, if permission can be be obtained from the tenants and landlords; and if the permission cannot be obtained, steel side posts to be erected, and the span wires carried from them." This is almost foolish enough to "queer" the whole report. Since when, might it be asked, did the members of this deputation begin to consider the old familiar problem of street lighting—whether the lamps should be placed along the centre or at the side of the roadway? This is one question, not to be answered off-hand, for Manchester or anywhere else, by reference to what they do in Milan, or Rome, or any other Continental city. If the question is to be answered deliberately in the affirmative, for good and sufficient reasons, it then becomes necessary to ask how the lamps are to be carried; and it is not too much to say that the system for which the Manchester deputation are so infatuated is the most objectionable that could possibly be devised. How high over the roadway should these pendant arc lamps be set waving in the breeze? What about fire-escapes, and lofty loads on waggons? Suppose some householders object to "rosettes" being fixed on their premises, and others do not, should there be a happy irregularity in the way of hanging the wires in the same street? When the "rosettes" are not available, where is the advantage of having two lamp-posts to a lamp instead of one? Really, the deputation must be regarded as having gone far to stultify themselves in the estimation of the British public, by their

great avidity in swallowing anything and everything Continental. The Manchester streets, away from the very centre of the city—for we can hardly suppose that even the deputation contemplate the rosetting and span-wiring of Market Street—are not lovely, but they are at least clear for traffic; and if electric lights and trams are to be put into them, it is due to the public that this should be done as inoffensively as possible.

THE PETROLEUM INQUIRY.

[Second Article.]

The Committee took a good deal of evidence respecting the storing of petroleum; the first witness called for this purpose being, very appropriately, Mr. J. Langdon Thomas, of Exeter, whose stores on the banks of the River Exe were the scene of the disastrous fire of December, 1882. This was one of the most serious mineral oil or spirit conflagrations that have occurred in this country. The stores were caves excavated in sandstone rock, holding from 500 to 800 barrels each. The fire was caused by the use of a lamp against orders. The light was held by a man close to the river side, as far away from the entrances to the caves as he could get (53 feet), while another man opened the door of a cellar containing naphtha in barrels. The naphtha vapour rolled out across the quay—the morning being dull and still—and ignited at the lamp with a flash and explosion. Strangely enough, the fire skipped one cellar which contained 500 barrels of petroleum oil. Mr. Thomas objected to the Inflammable Liquids Bill, which he thought would make it impossible to carry on the petroleum trade. With regard to lamps, the witness said: "Do away with the flimsy opal and glass containers and the cheap burners, and substitute metal or good glass containers, with best possible burners, with extinguishers, and the bulk of the accidents from the use of petroleum will be averted." The witness preferred American to Scotch oil, and thought the former quite as safe as the latter. He remarked that the trade in petroleum spirit for lighting purposes is a diminishing one—the benzoline lamp going out of use. Petroleum and paraffin wax candles, said Mr. Thomas, are "the poor man's light" of to-day. The witness was examined at considerable length respecting the circumstances of what the Chairman called the "terrible fire" at Exeter; but he adhered to his point that this was purely a naphtha fire, and had nothing to do with mineral oil except to prove the comparative harmlessness of the latter article at 73° flash-point.

The next witness was Mr. Robert Shaw, representing the Anglo-American Oil Company, who was very candid with regard to the character and working of this vast organization. He put the investment of the Company in plant and machinery at over a million pounds sterling. The Company have six large tank steamers running between this country and America. All the capital is American; the concern being practically a branch of the Standard Oil Company of America. Last year the Company delivered in the United Kingdom 2,589,221 barrels of lighting oil, 90 per cent of which was 73° Abel test oil, and the remainder water white 100° test oil. All this was American oil; the Company having no interest in any other. In all his experience, with the exception of the Huddersfield disaster, "brought about by an extraordinary combination of conditions and gross carelessness on the part of workmen," Mr. Shaw has never had any accident from fire arising from the storing, handling, or carrying of petroleum oil." Even at Huddersfield, the only tank that exploded was the one containing the high-test oil. Asked: "What have you to say on the subject of additional legislation relative to the storage, transport, and sale of petroleum oil?" the witness answered: "While I am fully alive to the necessity of giving ample protection to the lives and property of people, I am of opinion that no further legislation is necessary on that point." Then followed the question: "You would have no restriction whatever upon the storage or sale or distribution of petroleum?" The answer was: "No; I think it is unnecessary." The witness gave his reasons for this opinion. He declared that, regarded as a combustible, cotton is a very much more dangerous commodity than petroleum, and consequently more deserving of regulation from this standpoint. Mr. Shaw stated that the conduct of the petroleum trade has been revolutionized since 1883. There was then free speculation in oil; whereas now the trade is in the hands of the Anglo-American Company, and tanks have supplanted barrels. Upon the crucial question of flash-point, Mr. Shaw gave it as his opinion that the raising of the flash-point from 73° to 100° or 120° Abel test would not diminish the number of lamp accidents, and might, by giving a heavier and more sluggish-burning oil, tend rather to increase them. When the witness dealt in Scotch oil, the conditions of its use were entirely different from those prevailing to-day. The trade was not nearly so large; and the oil was not used by the poorer classes of the community. The witness was asked what would be the effect of raising the flash-point of American oil; and his answer was that it would be to materially advance the price. He did not think that additional uses would be found for petroleum spirit. For years past the course of trade has been in the opposite direction. "The small sponge lamps which were used in hundreds of thousands twelve or fifteen years ago are now practically extinct, and the gas companies which then used spirit largely for enriching purposes have now abandoned its use, and are supplying water gas instead." Taken to the actual imports, however, the witness did not succeed in establishing his contention; for he had to admit that the importation of petroleum spirit into the United Kingdom was 152,144 barrels in 1894, and 151,624 barrels in 1896. This does not look like a serious falling off in the demand for the spirit, whatever may be its uses. Questioned respecting lamp accidents, Mr. Shaw gave it as his opinion that in the majority of instances the flash-point of the oil would not matter. He said that the buyer of oil was quite in the hands of the retailer as to whether he gets "tea rose" or "white rose" oil when he asks for the latter and pays the higher price. The witness was of opinion that there is at present a difficulty in getting sufficient high-test oil from America to supply the existing demand; so that if the flash-point of all oil were raised, the result would be either to put up the price or create a new kind of supply prepared by the refiners from a mixture of "tops and bottoms." Mr. Shaw was pressed upon the point of the difference between American and Scotch oil; and he stuck to the declaration that "as a burning oil American petroleum oil is superior to Scotch. It is freer from smell, burns with a greater freedom from smoke, and gives a more brilliant and a clearer flame." Sir Benjamin Stone put witness a searching question which lifted the inquiry from the narrow groove of a conflict between Scotch and American or Russian oil interests into which it always had a tendency to fall. He inquired whether Mr. Shaw was satisfied that the evolution of the oil trade was progressing in a safe direction; and he put the following question: "You are satisfied that the general progress or expansion of the trade would lead one to hope that legislation might at some time or other be perfectly unnecessary?" The answer was: "That is my opinion."

Mr. Henry Cushen, the Chairman of Messrs. Davies and Evans, Limited—a firm owning seventy oil-shops in London—corroborated what had been said as to petroleum spirit having almost vanished as an illuminant. The witness dealt principally in American and Russian oil; there being very little demand for Scotch oil on account of its offensive odour and tendency to cloud the chimneys of the lamps. The bulk of this witness's evidence related to oil-shop fires; and he adhered to the opinion that 73° flash-point oil is perfectly safe—there being no reason to suppose that any greater degree of safety would be attained by raising the flash-point. Mr. Cushen, in common with some other witnesses, was quite content with 73°, and thought it a reasonable demarcation between petroleum oil, which they regarded as safe to handle and burn, and petroleum spirit, which is dangerous.

Mr. W. Angear, of Plymouth, explained the manner in which the Anglo-American Company's tank system has superseded the older method of private trading in barrels. Asked about the flash-points, Mr. Angear bluntly offered it as his opinion that one reason why some people prefer the white rose, or high-flash, oil is that it is dearer, "and they would consider that they were burning something better than their neighbours." This disclosure of a variety of human weakness which outraged the dictates of economy evidently shocked the interlocutor—Mr. M'Killop—who asked the witness whether he really thought it entered into "the characteristics of most people." But Mr. Angear was speaking for the West of England population, and he brazened out the Scotch member of the Committee by repeating that he was "quite sure it did in very many cases." After this the honourable gentleman gave up the point. The witness thought that no further legislation is needed in regard to oil; but he regarded the lamps as being in want of better regulation.

Mr. Base, of Norwich, testified that during his experience of upwards of twenty years neither himself nor one of his customers had had a single accident arising from the use or distribution of petroleum oil. He thought anything that could be done to ensure the sale of good sound lamps would be more beneficial to the whole country than any question of the distribution of the oil. The witness admitted that he was bound to the Anglo-American Company; but he declared that before he gave up dealing in Russian oil his interest in it was so small as to be not worth retaining. Whether handled by the barrel or in tanks, Mr. Base did not think there is any need for legislative interference with the storage, distribution, or use of these oils. "Owing to the immunity which has been enjoyed from accidents, and with a view to the large quantity of oil that is being distributed," there is as great safety in this trade as in any other. Mr. E. J. Thatcher, of Bristol, spoke of the extent of the trade transacted through this centre. He testified that the American product has come into general favour on its merits. This witness struck out a new line by declaring that the disappearance of the petroleum spirit sponge lamp is a hardship to the poor. He regarded the sponge lamp as perfectly safe—much more so for carrying about than the ordinary petroleum lamp, and vastly safer also than the common methylated spirit lamp of the dressing and tea table "on the use of which there are no restrictions whatever." The only improvement in the conditions of the trade the witness could suggest was the more general use by retailers and consumers of metal oil cabinets without taps, from which small quantities are withdrawn by working a fixed pump. Mr. Thatcher did not think the higher-test oil safer in use than the 73° flash-point oil; nor did he regard barrels as less safe than tanks.

OBITUARY.

We regret to announce that Mr. MATTHEW MURDOCH, the Manager of the Rotherham Corporation Gas-Works, died somewhat suddenly last Saturday morning, at the age of fifty years. The deceased was a native of Cupar, Fifeshire, where his father was a gas engineer. At the age of eighteen he came to London, and he was for upwards of twenty years Manager of the Colney Hatch Gas-Works. He subsequently went to Sheffield, where he occupied a responsible position in the gas-works. On the removal of Mr. C. B. Newton to Carlisle two years ago, Mr. Murdoch was appointed to the vacant position of Manager at Rotherham. He was attacked with illness about a month ago; but hopes were entertained that he had recovered. A fresh seizure took place on Thursday, however, and he expired on Saturday morning from exhaustion due to hemorrhage. He leaves a widow and three children.

PERSONAL.

Alderman ELLIS has resigned the chairmanship of the Maidstone Water Company, as well as his seat upon the directorate. He is succeeded by Mr. G. MARSHAM.

Mr. ARTHUR MEAD, who since relinquishing the management of the Chelmsford Gas-Works, has held an appointment with the Economical Gas Apparatus Construction Company, Limited, is now associated with Messrs. Alfred Williams and Co., of Bankside.

Mr. F. SMALLBONE, the Manager and Secretary of the Hoddesdon Gas Company, has been appointed Manager of the Chigwell, Woodford, and Loughton, Gas Company, in succession to the late Mr. Allan Brown. It may be remembered that applications for the position which Mr. Smallbone has been successful in securing were invited in the "JOURNAL" for the 5th ult. He commenced his career at Newbury, under Mr. J. G. O'Farrell, and assisted him in the erection of entirely new works. After Mr. O'Farrell left, Mr. Smallbone remained with his successor, Mr. R. M. Couper. Eight years ago, he was selected by the late Mr. R. Paulson Spice, out of 121 applicants, for the Hoddesdon appointment; and during his tenure of the position the works have been enlarged and thoroughly modernized and the mains relaid under his supervision. So excellent have been the working results he has produced, that the price of gas has been brought down from 4s. 9d. to 3s. 10d. and 4s. per 1000 cubic feet; while an extra 2½ per cent. (making up 10 and 7 per cent.) has been paid to the shareholders on the Company's somewhat heavy capital. Mr. Smallbone has up to now had a successful career; and we cordially wish him a continuance of it in his new sphere of labour.

THE "ENGINEERING MAGAZINE"—AMERICAN SHOP PRACTICE.

IT is announced in the current number of the "Engineering Magazine" that henceforward there is to be an English edition of this bright and bustling publication, which has hitherto been known only in an American dress. If, as the publishers promise, the European edition is to be independent and self-contained, and if the English editors—among whom are included Mr. H. Graham Harris, Mr. James Swinburne, and Mr. W. Worby Beaumont—are only able to do themselves justice, the magazine should be well worth buying regularly. The American edition has always been a model of printing and illustration, and has been supplemented by a well-executed subject-matter index of contemporary technical publications. But the articles have in too many instances been unworthy of their setting. The current number, however, contains several distinctly good communications, to which we may have occasion to recur. For the present, we will confine our attention to an article entitled "Cost-Keeping Methods in Machine-Shop and Foundry," which comes very opportunely to throw additional light upon the comparison between engineering trade methods in England and the United States, discussed in the "JOURNAL" for the 20th ult. The author of the article now in question, Mr. Henry Roland, very properly points out that the first aim of a shop manager or superintendent who is immediately responsible for the cost of the manufactured articles produced is always directed to the reduction of the labour cost. Such a statement as this is calculated to act like the proverbial red rag to a bull upon the susceptibilities of socialistic labour "reformers," who will ask indignantly why it is always the poor workman who is to be "economized." The answer is that while the labour may not be always or generally the largest component of the total cost, it is the one element which can be reduced. This can be done in two ways—by lowering the workmen's wages or increasing his productiveness. There is no other way of attaining it.

The most obvious method of recompensing labour is by a daily or hourly wage, which is the method that underlies all others. This system, Mr. Roland observes, assumes that an hour of the workman's time has a certain value, or "going rate," which may vary considerably for different localities. Formerly, the writer goes on to say, there were but two classes of workmen in an American machine-shop or foundry—apprentices and full hands. Now there are "sweepers," "labourers," "skilled labourers," and "boys"—the latter taking the place of the old apprentices, to be eventually "passed on into the full-hand list, if they prove bright and trustworthy, or rising no further than the rank of skilled labourer if they are of the common turn of mind, content with small certainties." By means of these intermediate grades, the hour-prices of labour are in many places made to differ very greatly in the same shop." "A boy at 40c. per day or a skilled labourer at $1.25 per day often attends a machine which under the old order of things might have been managed by a full hand at $2 or $2.50 per day; and this brings the hour-price of labour much nearer its actual value to the shop than was possible with the 'apprentice' and 'full-hand' labour divisions only." Mr. Roland thinks that the final result of this system is to fill a shop which is well managed with a working force of steady-going, orderly, well-disciplined men, who produce a moderate output of good work with great uniformity of labour cost. To increase the output and fix the labour cost, a plain piece-rate system may be substituted.

Piece-work may be priced upon two principles. One practice is based on a theory of increasing floor-area production, or (which is the same thing) decreasing the percentage of general expenses which must be added to the prime cost to obtain the total cost. This practice involves a fixed and unchanging piece-rate, on the ground that it is more profitable to increase the workman's output than to decrease the piece-work price of labour. Under the other system of piece-work, the workman is rated until he can only earn at it a little more than the day rate of wages. Mr. Roland evidently prefers the former system, though he admits that the question of relative individual production of workmen to total cost has not been properly considered in the United States—nor, it may be added, elsewhere. "The attention of foundry and machine-shop managers cannot be too strongly directed to the fact that every square foot of shop-floor must be regarded as an augmenting factor of the expense account; and the best management of workmen is that which produces the greatest output per square foot of floor and per hour of time, and that the maximum effects in these directions cannot be secured with low-priced men whose only aim is to escape discharge and reach pay-day." It is remarkable that Mr. Roland does not mention the "Union stroke," which is a fair indication that in some way this dry-rot of the engineering and other mechanical trades does not trouble American shops.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Autumn Meeting of this Association was held in Birmingham last Thursday, when there was a fairly large attendance of members, notwithstanding that the *agenda* of business did not notify the fact that anything beyond formal business was to be transacted previous to a visit being made to the New Conveyor Company's works at Smethwick. Mr. Meiklejohn, however, with his usual energy and determination to prove that he has the best interests of the Association always at heart, prepared and read a description of some of the most useful forms of the New Conveyor Company's plant—parts of which, in process of manufacture, were inspected by the members later in the afternoon.

In the absence of the PRESIDENT (Mr. John Young), who has only recently taken up his new appointment at Norwich, and so could not arrange to attend the meeting, the chair was occupied by Mr. J. T. LEWIS, of Wellingborough, the Vice-President.

Before commencing the business of the day, Mr. LEWIS, on behalf of the Association, offered their hearty congratulations to Mr. Young on his preferment. Though sorry to lose him from the district, he said all must be delighted that the Directors of the British Gaslight Company had such a high appreciation of Mr. Young's ability that he had been selected to occupy the responsible post at Norwich vacated by Mr. Linging.

The HON. SECRETARY (Mr. Meiklejohn) then read the minutes of the last meeting of the Association—that held at Stoke in May—and they were confirmed. He subsequently read out the names and qualifications of the following three applicants for admission as members; and all were duly elected:—

Mr. T. Berridge, Manager of the Leamington Priors Gas Company.
Mr. F. Niven, Manager of the Rowley Regis and Blackheath Gas Company.
Mr. T. Watson, Manager of the Rushden and Higham Ferrars Gas Company.

The appointment of office-bearers of the Association for 1898 was then proceeded with.

Mr. HENRY HACK (Saltley) proposed that Mr. J. T. Lewis, of Wellingborough, should be appointed President of the Association for the ensuing year. He said that Mr. Lewis had for many years taken an earnest interest in the welfare of the Association—not only by his attendance at almost all their meetings, but by his contributions to the proceedings in the way of papers and by taking part in the discussions of others' papers when he could usefully add anything to their general stock of knowledge. As President, he (Mr. Hack) felt sure Mr. Lewis would add to his already long list of warm friends among the members of the Association.

Mr. W. Belton (Shrewsbury) had much pleasure in seconding the proposal, as he always regarded Mr. Lewis as "a first-rate specimen of a hard-working gas manager."

The proposition was heartily agreed to, and duly acknowledged by Mr. Lewis.

Mr. T. Glover (West Bromwich) proposed for the office of Vice-President, Mr. J. S. Reeves, of Bilston—a gentleman who had, he said, already done good service for the Association as Hon. Secretary for some years.

Mr. G. Helps (Hinckley) seconded the motion; and it was carried.

The re-election of Mr. Peter Simpson, of Rugby, as Treasurer, was proposed by Mr. W. North, and cordially assented to; as was also the re-election of Mr. Meiklejohn, as Hon. Secretary, on the motion of Mr. R. O. Paterson, seconded by Mr. Hunt.

The new members appointed on the Committee, in place of those retiring by rotation, were: Mr. W. Belton, of Shrewsbury, and Mr. A. Cooke, of Oldbury.

The election of Auditors completed this part of the business—Mr. Percy Winstanley, of Nuneaton, and Mr. H. P. Maybury, of Great Malvern, being elected on the motion of Mr. J. S. Cranmer, of Stratford-on-Avon.

Mr. Meiklejohn then read the paper given below; and for this, and for the zeal, energy, and ability with which his other services to the Association during the past year had been rendered, he was subsequently accorded a hearty vote of thanks.

Votes of thanks were also passed to the rest of the retiring officers—a special message of congratulation to Mr. Young being added to the more formal acknowledgment of the President's services.

Leaving by train from New Street Station just before 3 o'clock, the party proceeded to Smethwick to visit the works of Messrs. Little and Graham (the New Conveyor Company), and inspect the plant of the Company and the apparatus in course of construction. Here the members were met by Mr. S. Smith, the Chairman of the Smethwick District Council, Mr. B. W. Smith, the Manager of the Smethwick Gas-Works, Mr. Gilbert Little, and Mr. Maurice Graham, and conducted round the works—inspecting the methods employed in the manufacture of the various conveyors, elevators, stokers, drawers, washers, dryers, mixers, separators, measuring chambers, retort mouthpieces, roofs, floors, &c., used in gas and chemical works, coal-stores, collieries, &c.

The works are practically under one roof, made up of seven spans; the space under each of these being used for one class of work. The first and largest bay has been designed, and is used, for the purpose of cutting, fitting, and erecting the iron-work required to brace the benches of "slopers" and carry the conveyors placed over the storage tanks, or for roofs and columns suitable for coal-stores, screening plants, &c. This shop is fitted with a 10-ton overhead travelling crane; and everything necessary for the economical working of the iron seems to have been designed and adopted where possible—including novel straightening, bending, riveting, sawing, cutting, punching, shearing, welding, and flanging machines. Special mention should be made of the large bending-rolls which are fitted with a compound engine having quick reversing gear, and all the latest improvements. In this shop were seen finished, or in course of erection, a 30-inch oxide elevator for the Edinburgh and Leith Corporations (Baltic Street) Gas-Works; two 15-inch steel-cased push-plate conveyors about 110 and 59 feet long respectively, which are for the purpose of renewing the plant erected for Mr. Winstanley five or six years ago; also a part of the steel casings for two 20-inch coal elevators now being erected at the Meadow Lane Gas-Works, Leeds, where, as stated in the "Journal" last week, the Company are at present engaged on the contract for a complete new retort-house fitted with 28 beds of "inclines." The next bay contains the machine shop, where there are working the heavier lathes and shaping machines for turning the shafting as well as finishing the castings, &c., required for coal crushers, dryers, picking bands, &c.; and a well designed muffle-furnace is situated opposite the bending-rolls and flanging-press. Alongside the heavy machine department is the light machine shop, where the drills, borers, and other small machines are fixed. The only heavy machine in the shop is the one used for coiling the spiral steel for the screw conveyors; and, judging from the attention paid to it by the visitors, this machine appeared to be the most interesting in the works. Standing watching the process of coiling a 3-feet diameter screw from a piece of cold steel 2½ inches by ⅜ inch thick 39 feet long, one naturally looks on this machine as "something more than human," especially when Mr. Little stated that, without removing the rolls, coils from 3 to 36 inches in diameter of any reasonable pitch can be twisted as desired with bars ranging from ¾ inch by $\frac{1}{16}$ inch to 3 inches by ⅝ inch. Adjoining this building is the fitting shop, provided with two overhead travellers. Here the worms coiled on the spiral machine are fixed on the shafts and fitted in troughs. For the benefit of the visitors, a belt had been fitted to a small spiral conveyor into which coal was put and carried by the coil to the opposite end. Chains of all descriptions were to be seen—consisting principally of the detachable type so largely used on coal elevators, and for driving purposes, but also comprising the special patterns designed for tray, push-plate, picking, and other styles of conveyors used generally for conveying coke, lime, ash, bricks, coal, phosphates, soda, clay, &c. In the same shop, but under the scope of the second of the overhead cranes, large elevator buckets were being marked off ready for the drilling shop; and when finished they are brought back to have strong lips riveted on, and chains attached. Several elevator boots were being fitted up at the other end of the shop; and two four-roll cannel coal breakers for the Leeds Gas-Works were nearing completion. A special feature of the breakers is the renewable and interchangeable gun-metal bearings. An opportunity was given of seeing one of these crushers (of the single-roll type) at work; and close to this a push-plate conveyor for the new refuse destructor at Antwerp was being tested. On passing through the extreme end of the large machine shop, attention was attracted by the welding of angle-iron frames which form a part of the storage hoppers connected with the inclined retorts; and those who are interested in any humane device for reducing unhealthy labour in any way, or who have a knowledge of the white-lead industry and existing methods of drying this poisonous substance, had an opportunity of observing a steam white-lead dryer which renders the process automatic and harmless. The visitors next inspected the drawing offices, and observed that the "Gas Department" is considered worthy of a separate office, quite distinct from the "Stoking, Screening, and General Department." Owing to the limited time at disposal, it was impossible to visit the smithy and forge, boiler shops, and erecting yards, the chain or pedestal stores, and several other shops which are distinct from the general buildings. These, it may be mentioned, are fitted like the other portions with every kind of labour-saving machinery, and almost every known device for reducing cost and ensuring satisfactory results. Although the shops are extensive, it is becoming rapidly apparent that additions are necessary to enable the Company to cope with the increasing demand for their specialities; and it is not surprising to learn that a fine space of land which has been walled up for this purpose has already been measured off for an extension of the structure shop, and that adjoining this, preparations are being made for a complete new foundry. Mr. Graham, who is Mr. Little's colleague in charge of the Gas Department, stated that the firm intend to erect both these additions without calling in outside contractors, in the same way as the existing shops were built.

On the return to Birmingham, tea was served at the Grand Hotel, and this brought to an end the proceedings of the Association for the year 1897.

Mr. Meiklejohn's Paper on "Unloading, Distribution, and Re-Loading of Materials in Gas-Works."

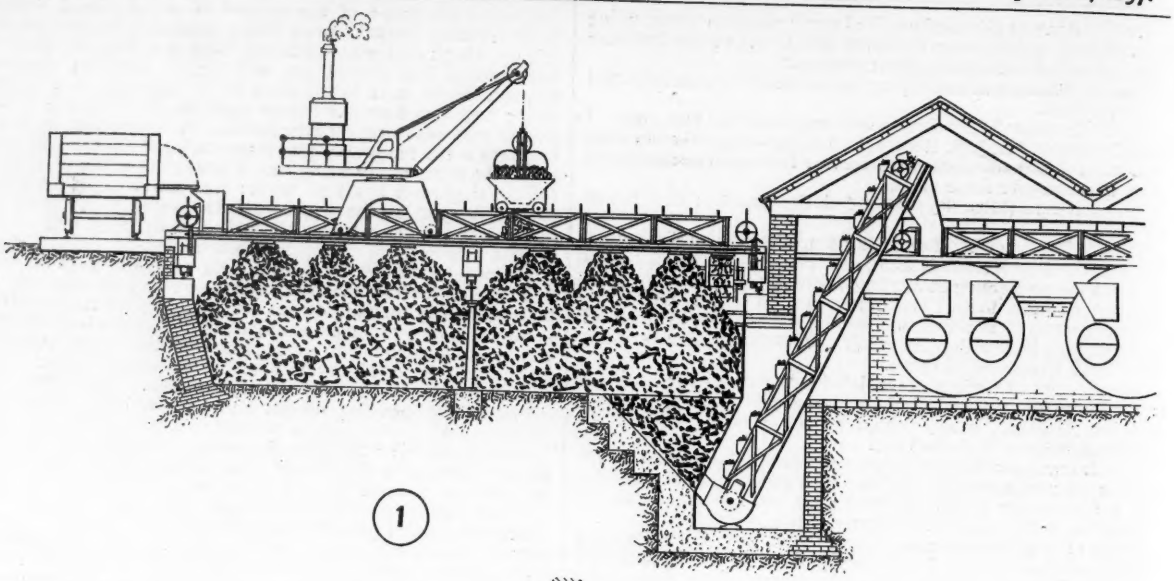
In view of our approaching visit to Smethwick, to inspect the works of Messrs. Little and Graham (the New Conveyor Company), it occurred to me that it might not be unwelcome if I made a few notes on the particular work there carried on, and especially in regard to the unloading, distribution, and re-loading of materials in gas-works. The enormous amount of tonnage comprised in the materials delivered to, and sent from, the various gas-works in this and other countries, and the handling of those materials in the works, is, I think, sufficient reason for placing this subject in the forefront of interest for those who are responsible for their efficient and economical management.

The introduction of machinery into gas-works is, of course, no new thing; and in the largest works, at any rate, we find more or less complete installations of mechanical appliances have been introduced in recent years, with a view to minimizing the most arduous labour in the works, and, while cheapening the cost, to lessen the probability of any serious dislocation in the process of manufacture. These, surely, are three good and substantial reasons for the introduction of machinery into large works. In the first place, the workers are benefited by the transference of the hardest work to the machine; the cheapening of cost promotes the success of the undertaking; and, by safeguarding the continuity of the manufacturing process, the manager sleeps better.

But in small and moderate-sized works, I think I dare venture to say, little advantage has been taken of the appliances now to be had for mechanically dealing with coal, coke, &c., on the works. It is quite apparent that the introduction of machinery into a gas-works will be most successful when the work to be done approaches its maximum capabilities, and when it can be kept working at that rate for the longest possible period. When these conditions are reversed, the opposite result must follow. Consequently, for small works, stoking machinery would be an expensive luxury. But when we consider the application of machinery to conveying coal, coke, oxide, &c., in a gas-works, the benefit of mechanical appliances would appear to be more nearly proportionate to the size of the works; the power necessary to drive the conveyors, &c., and their capacity being determined by the work required of them.

It would be remiss on my part—although only referring to the subject in general terms, and with illustrations devoid of detail—to omit reminding you of the very complete installation of labour-saving appliances erected by Mr. Hack to his own design at Saltley, and which we had the privilege of inspecting after the annual meeting of the Association in 1895.

Although one of the effects of the introduction of machinery must, of necessity, be some reduction for the time being in the



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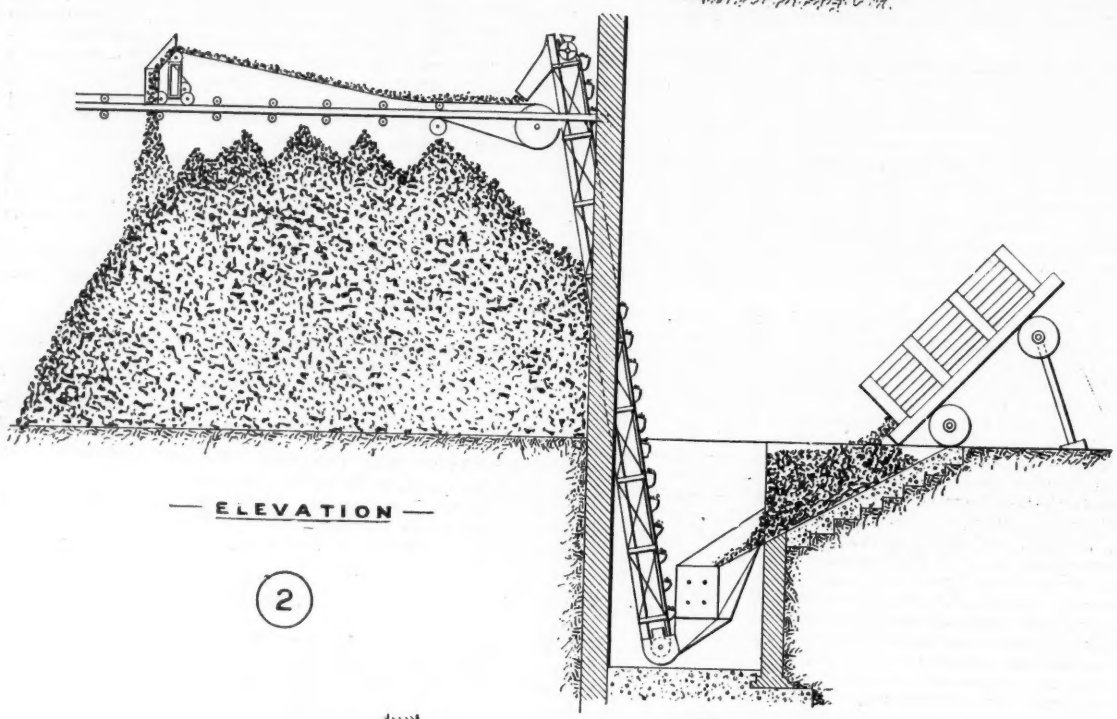

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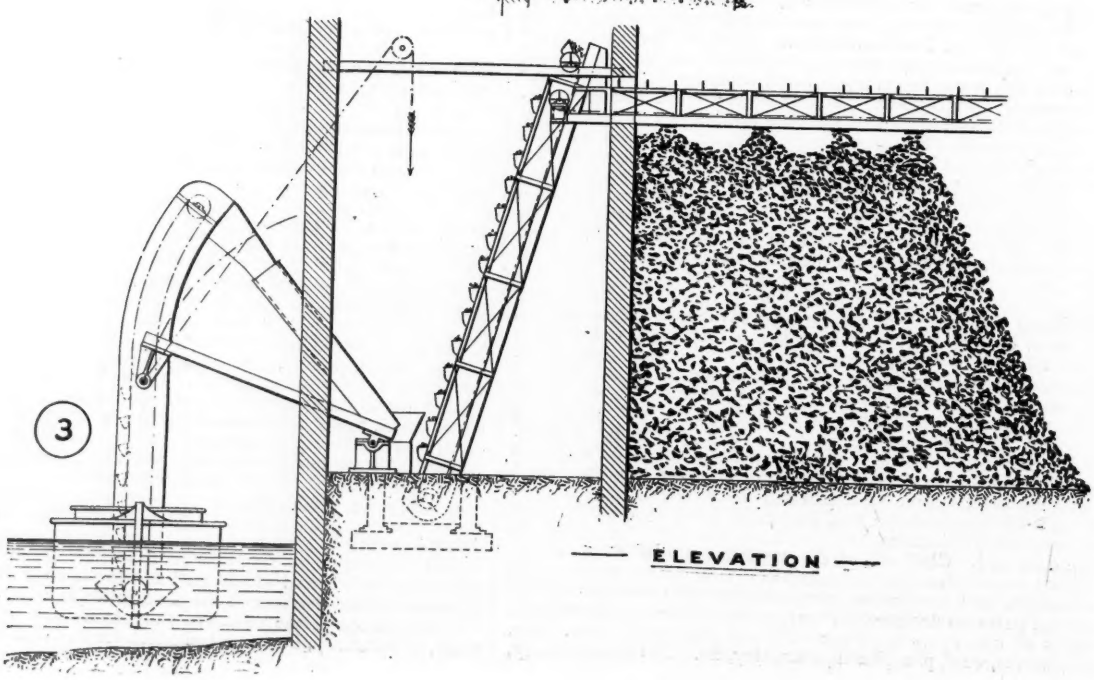

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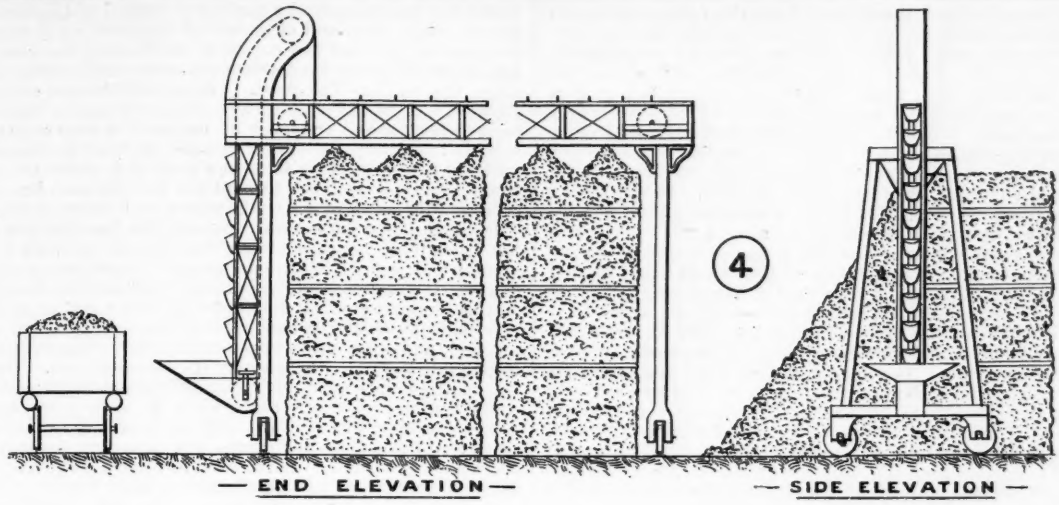
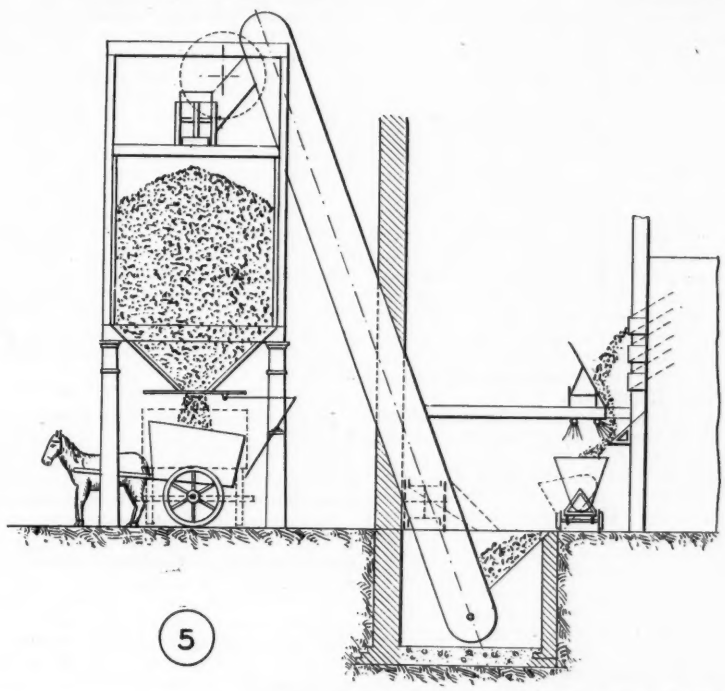
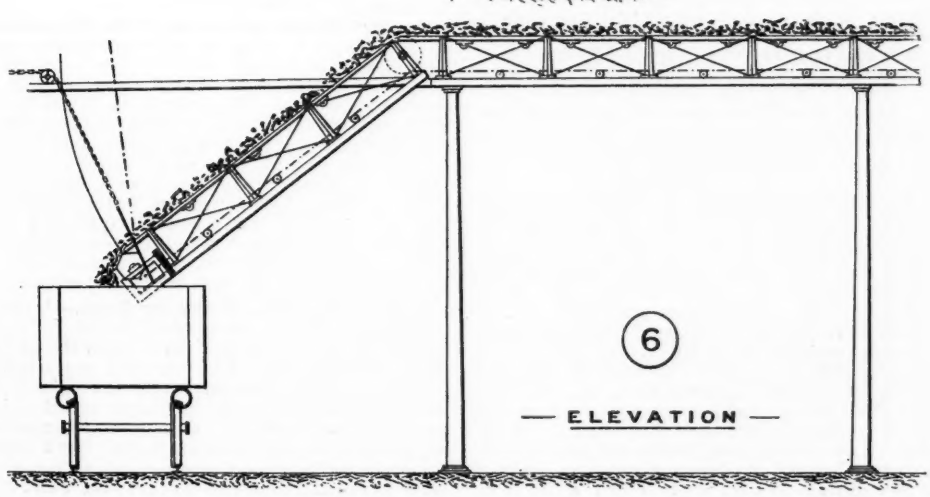






number of hands employed, it surely cannot be said that, since mechanical science has developed, the volume of labour has declined. Is it not rather that, by cheapening the cost of production, a fillip has been given to industry, the lot of the workman has been ameliorated, and the rapid expansion of business made a possibility? While we may not just yet hope to control the labour of a gas-works by the pressure of a button in the office, I think there is an excellent opportunity for many of us to lessen the cost of manufacture, to have more independent control of the men, and to add much to our own peace of mind, by the adoption of every mechanical appliance that can be economically introduced.

The illustrations shown represent some of the latest appliances manufactured by the New Conveyor Company; and I beg heartily to acknowledge my indebtedness to Messrs. Little and Graham, who made it possible for me to place them before you with the explanatory notes that follow.

Diagram No. 1 is an illustration of an automatic coal-store;

the coal being brought in waggons from the railway-siding to the traversing conveyor, which trims and stacks the coal over any part of the yard. The illustration shows an arrangement prepared for a large electric lighting station, with a range of 28 double-flued boilers; but it could be easily modified to deal in a similar way with the coal for a battery of coke-ovens or a bench of retorts. It could also be modified and altered so that the traversing conveyor could be fixed at any desirable height above the waggon, and the coal from the waggon lifted to the heightened conveyor by means of an elevator. In the design before you on diagram No. 1, the discharge of the coal is regulated by means of the outlet-doors; and the conveyor is arranged (as you will notice) so that it can be moved along the yard longitudinally; the distance of the travel being limited only by the length of this storage yard. The power necessary to work and control the traversing conveyor is obtained from the small engine of the grab mounted upon the girder of the conveyor; and the grab carriage is arranged to move on rails along the conveyor. The object of this is to keep the coal within range of the grab; but the grab is brought into use only when it is necessary to lift part of the storage coal into the conveyor. The method of feeding the 28 boilers is to utilize the grab on as few occasions as possible; and to attain this end, the coal is carried from the waggons by the conveyor only as each supply comes into the works, and delivers into the end of the yard immediately over the boot of the elevator. The supply for the boilers, as I have stated, is taken from that part except when the supply runs short, when the grab is brought into use to lift the storage coal from the yard, and deliver it into the conveyor, which in turn shoots it into the part over the elevator boot, and thence, by means of the elevator, to the conveyor, which distributes it into each of the 56 hoppers of the mechanical stokers on the 28 boilers. At the foot of the elevator boot, a door is fitted to prevent the coal from choking; and this door is operated by a patent self-acting arrangement connected from the driving shaft of the elevator, so that the quantity of coal allowed to pass into the boot is controlled by the speed of the buckets. The correct quantity only is admitted; so that all risk of a stoppage is obviated. If an arrangement like this were made to deal with the coal for a bench of gas-retorts, the coal would be lifted in a similar manner to the storage tanks or stores along the range of retorts, and trimmed to each in a similar way to that adopted in the drawing before you to supply the range of 28 steam-boilers. The arrangement on Diagram No. 1 would be very suitable for the coal-yard of a large gas-works with an installation of sloping retorts.

Diagram No. 2 shows a general arrangement for unloading coal by tipping the truck up at the end to shoot the coal, as shown, into the receiving hopper over the coal-breakers. Many different arrangements on lines similar to that shown in Diagram No. 2 are already at work, particularly in connection with batteries of coke-ovens and coal-washeries. The waggon is brought to the point where it is to be emptied; and the raising of the waggon is generally effected by means of a small hydraulic ram. As the contents of the waggon are tipped into the hopper over the breaker, it gradually slides into the coal-breaker; but in front of the breaker it is preferable to arrange a small screen through which the smaller coal falls direct to the elevator boot, and the large pieces pass into the rolls of the breaker—adjoining the small screened coal at the point just above the elevator boot. The elevator lifts the coal, and delivers it on to a band conveyor, which can be made any desirable length to trim coal over a store from 20 feet to 1000 feet in length. The band conveyor is found, from experience, to be preferable if made of a combination of canvas. The coal is delivered from the band conveyor by means of a throw-off carriage, as shown, which can be moved as desired, from point to point, to trim the coal at any part of the yard. The conveyor band may be made any width, to deal with quantities of from 20 to 600 tons per hour.

Diagram No. 3 shows an arrangement of elevators and conveyors for unloading coal from a barge on the canal or river, and distributing it over a coal-store or a coal-yard. The elevator which you see is arranged to take the coal from the barge, is made with a close dust-tight casing to prevent dust blowing about in an elevator fixed in this open manner. The barge elevator is raised or lowered as may be necessary to suit the rise and fall of the water or tide, by means of compensating balance-weights. The elevator working in the barge, lifts and delivers the coal into the telescopic shoot, which in turn feeds the small hopper over the boot of the stationary elevator; and this stationary elevator lifts the coal and delivers it into the conveyor, which in turn trims it or discharges it at any point in the coal store or yard. The conveyor can also be arranged to trim direct into the storage hoppers used over a bench of inclined retorts, or into the storage hoppers used to feed a West or Foulis stoker. The conveyor over the store or yard can be made any desirable length, like the band-conveyor on Diagram No. 2; and of any desired size, to deal with any quantity of coal per hour.

Diagram No. 4 shows an arrangement of a combined portable elevator and conveyor, which you will I think admit is something of a novelty, to trim coal or stack it all over a yard. You will notice that the coal-stack is shown walled up all round. The coal is shot from the waggons into the hopper of the elevator boot, and the elevator lifts it into the traversing conveyor, which in turn trims it over the yard, as shown. The traversing conveyor can be made any desired width, to suit any size of yard. The end elevation of Diagram No. 4 shows the stack walled up, and the conveyor discharging the coal. The side elevation shows the combined elevator and conveyor moving along the yard or the store. The superstructure, as you will observe, is light and simple; and the power can be transmitted to the elevator and conveyor by means of a rope or detaching shaft. This form of conveyor can also be made to unship or be taken to pieces to move from one part of a works to another, when it is not convenient to continue an unbroken line of rails all round the parts of the works where coal can be stored.

Diagram No. 5 shows an arrangement for handling and storing the coke from benches of gas-retorts and batteries of coke-ovens; and many similar arrangements have been installed to deal with the ashes from boilers and furnaces of all descriptions. In this diagram you will notice that I show a setting of inclined retorts, from which you will observe the coke is falling against a shield, and from there into a coke truck. The coke truck is tipped into the receiving pit over the elevator boot. The coke, before tipping, is generally quenched in the truck; the waste water running off in the usual way. In some cases, however, a tray conveyor to catch the coke is provided instead of the truck; and the conveyor carries the coke and delivers it into the receiving hopper over the elevator boot. Either or both of these arrangements may be adopted in large works to meet the requirements of the retort-house. The coke when delivered into the hopper over the elevator, falls into the boot, and is elevated to the revolving or shaking screen, which divides the coke into the desired sizes. From the screen, the coke drops into the conveyor fixed over the large storage hopper, which trims it all over the storage; and the waggons or carts can be automatically filled by actuating doors and levers in the bottom of the storage hopper. An installation of this description, which is considered somewhat unique, can be seen by members of this Association at the gas-works at Nelson, Lancs.

Diagram No. 6 shows an arrangement of conveyor with an automatic dipping end, largely used in connection with batteries of coke-ovens, to deliver the coke into the waggons or barges with a minimum of breakage. A similar system is applied with advantage in gas-works. The coke is carried in the usual way on the horizontal part of the conveyor; and the end is made to dip and rise at will by means of counterbalance weights, and the special arrangement of drive which any members of the Association can see in detail during their visit to Smethwick this afternoon.

Institution of Civil Engineers.—The new session of the Institution will be opened this evening, when the President (Sir J. Wolfe Barry, K.C.B.) will deliver an address, and subsequently present the medals awarded by the Council. There will be a reception by the President after the meeting.

Detection of Carbonic Oxide in Air.—A solution of silver nitrate to which just sufficient ammonia has been added to cause the disappearance of the brown coloration which is first formed, is recommended by Habermann for the detection of small quantities of carbonic oxide. Pure air bubbled through the filtered solution, does not cause any change in it; but if the air contain only 0·1 per cent. of carbonic oxide, a brown coloration at once appears. The test may be useful in seeking for escapes of water gas into the air of rooms.

Southern District Association of Gas Engineers and Managers.—The autumn meeting of this Association will be held on Thursday, the 11th inst., at the Holborn Restaurant, under the presidency of Mr. J. W. Helps, of Croydon. We learn from the circular issued by the Hon. Secretary (Mr. D. H. Helps) that, in addition to the usual business at the final meeting of the year—viz., the election of the new President and office-bearers—there will be two papers. Mr. C. C. Carpenter, M.Inst.C.E., the Deputy-Engineer of the South Metropolitan Gas Company, will deal with the subject of "Retort Setting and Retort Heating;" and Mr. F. Smallbone, the newly-appointed Manager of the Chigwell, Loughton, and Woodford Gas Company, will describe "Charging Apparatus for Small Gas-Works." At the conclusion of the business, high-tea will be served.

Junkers' Gas Water-Heater for Baths.—A recent number of "Le Gaz" contains an illustrated description of the above-named appliance, which is on view in the show-rooms of the Paris Gas Company. The feature of superiority claimed for it is that it utilizes very effectively the calorific power of gas. This is brought about by the large extent of heating surface presented to the water. The apparatus consists of two concentric cylinders, between which are placed very close together flat vertical tubes. These convey away the products of combustion, which transmit their heat to the water contained in the space between the cylinders, in the lower part of which the water is heated directly by the circle of gas-jets below it. These are ignited by a small flash-light. According to some experiments made by the engineering staff of the Company, 33 gallons of water were raised to a temperature of 98° Fahr. in 16 minutes with the consumption of 31 cubic feet of gas. The temperature of the products of combustion, taken at the outlet, was between 150° and 158° Fahr. The heater can either be supported on wall brackets or rest upon a stand. In the former position it rises to a height of 3 feet; in the latter, it is 6 inches higher,

REGISTER OF PATENTS.

Water-Meters.—Boult, A. J.; a communication from T. Derichs and Hegenscheidt Bros., of Brussels. No. 21,296; Sept. 24, 1896.

This invention has for its object improvements in the class of water-meters described in patent No. 17,780 of 1894; experience having shown the patentees "certain drawbacks which it was possible to avoid, and also that it was possible to improve the working of the apparatus and to simplify its construction."

Indicating Apparatus for Gasholder, Station Meters, &c.—Settle, T., of Exeter, and Berry, C., of Huddersfield. No. 22,419; Oct. 9, 1896.

The chief object of this invention is to provide means whereby the cubical contents of a gasholder may at any moment be ascertained at any distance from the works; but it also applies to the recording, at a distance, of the quantity of gas, air, or other fluid contained in any vessel, or passing any particular point—as in a station meter, for example. For this purpose, a contact-maker is employed, operated by the rising or falling of the holder, or by the "thousands" hand of the station meter; and in connection with these contact-makers are electrically-operated indicating mechanisms.

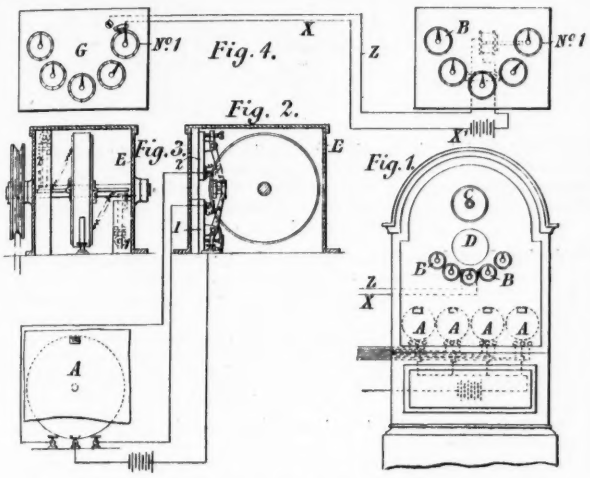


Fig. 1 is an external elevation of the indicating apparatus. Fig. 2 is a side view, partly in section, of a gasholder contact-maker, showing its connection with the indicating-dials. Fig. 3 is a front view (partly in section) of the contact-maker.

In fig. 1, A is the indicating mechanism referred to, in connection with four gasholders, and arranged to show the contents of each holder at any time; B is the mechanism indicating the state of the station meter also at any given moment; C is a clock; and D is a disc of paper on which a diagram is drawn. This apparatus is placed (say) in the engineer's office, or other position convenient for his use at any distance from the gas-works.

In connection with each holder is a contact-maker; the form preferred being that shown in figs. 2 and 3. E is a box or casing, in the sides of which are the bearings for a shaft, which projects through the side, and carries on one end a pulley or sprocket-wheel to receive a chain or cord, one end of which is attached to the top of the holder, and the other to a weight. This box is placed at the top of one of the columns of the framing. The mechanism is operated in one direction by the descent of the weight, and in the other by the descent of the holder. Upon the shaft, and insulated therefrom, is mounted a metal disc; and hinged to opposite sides of the discs are bell-cranks, the longer arms of which are maintained in a horizontal position by light springs. The cranks act in opposite directions, as shown. In rubbing contact with the edge of the disc is a blade, connected through the terminal and its wire with one pole of a battery. The longer arms of the bell-cranks act as contact-pieces; and they strike once in each rotation against other and fixed contact-pieces (1, 2), in order to close a circuit through the index-apparatus to the other pole of the battery.

These fixed contact-pieces consist each of a spring regulated lever of insulating material, which carries, at its outer end, a metal piece electrically connected with the terminal. As the disc rotates, under the rising or falling action of the holder, the arm strikes against its lever and rides along it—depressing it as it goes. When the arm comes to the end of the lever, it slips past it, and comes in contact with the plate, and momentarily closes the circuit in which the indicating mechanism is situated. The arm which is not, for the moment, operating to make contact, strikes against an insulating block carried by a lever, and trips past it; a spring bringing the arm back to its normal position.

The indicating apparatus consists of a numbered dial, to which motion in opposite directions can be given as follows: On the spindle of the dial are mounted two ratchet-wheels worked by pawls connected with the armatures of, and operated by, electro-magnets. One pawl has a double face, or two pallets, and works across one of the wheels one pallet acting also as a retaining pawl; while the other pawl acts in the ordinary way on the second wheel. The magnets are connected by wires leading from their respective contact makers. Thus, according to the movement of the holder, one or other of the pawls acts to work the dial in the desired direction, and so indicates fairly accurately, at any moment, the contents of each holder.

Referring now to fig. 4, G represents the station-meter index; and B, as before mentioned, the indicating-apparatus in the engineer's office or elsewhere. Dial No. 1 will represent for each revolution of the pointer 1000; and the pointer, once in every revolution, will touch platinum points carried by an insulated plate, and connected by the wire X with one pole of a battery. The other pole of the battery, through the indicating mechanism B and the wire Z, connects with the metal plate G carrying the station-meter index.

Atmospheric Gas-Burners and Incandescent Material Arranged thereon.—Smith, W. B., of College Street, Chelsea. No. 23,933; Oct. 27, 1896.

The patentee's proposals are: (1) To enlarge the mouthpiece of the burner described in patent No. 5312 of 1893; (2) to construct a second mixing chamber—*i.e.*, where a second supply of air intermixes—to a burner with a small outlet at its first mixing chamber; (3) to provide a burner with a support for the base of a mantle, and to use the base of or make a mantle suitable for being supported by its base; (4) to construct a socket or clip attachable to the base of a mantle, and attachable or fixed to a gas-burner; (5) to arrange a group or ring of burners suitable to go under one mantle; (6) to construct a burner producing a flame like the flame of an argand burner, but atmospheric; and (7) to arrange incandescent material on the inside of the flame described above.

The last-named proposal is thus referred to by the patentee in his specification: "Upon the inner side of the flame of a group of burners, or a modification of same, or upon the inside of an atmospheric ring-flame, I arrange incandescent material with or without incandescent material upon the outside of the same flame. The mantles mostly in use may be divided into two principal groups—those emitting excess of green and yellow rays, and the others excess of red and violet rays. If I wish to produce a pure white light, I put a red mantle upon the inside and a green mantle upon the outside of the ring flame; if I desire a soft light, I put a green mantle inside and a red mantle inside and a red mantle outside; if I desire a very powerful light, I put green mantles inside and outside."

Atmospheric Gas-Burners.—Lewis, C. E., of Stratford-on-Avon. No. 24,832; Nov. 6, 1896.

This invention relates to improvements in, or additions to, atmospheric gas-burners for stoves, muffles, and furnaces, and for cooking and heating appliances, incandescent lamps, and other purposes; and it has for its object, "a further or increased inclusion of atmospheric air with the combustible gas or vapour that is obtained with the ordinary air-inlet as now employed," so as to generate an intense heat.

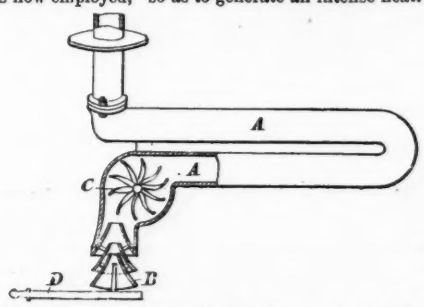


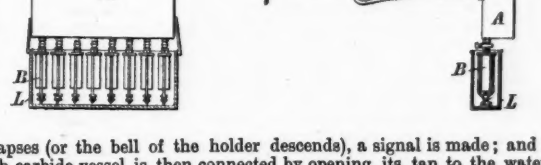
Fig. 1 represents a burner provided with a mechanical gas and air mixer and forcer, constructed according to one form of the invention.

A is an elongated U-shaped mixing chamber leading to a jet or jets where the mixture of gas and atmospheric air is burned. The entrance to the mixing chamber may be enlarged or formed bell-mouthed, wherein two funnel-shaped cups or open-ended leads or mouths B (separated from each other by division spaces) are located, with their nozzles disposed preferably in an axial line, and pointing in the same direction. All the cups are arranged in a nest—*i.e.*, one within the other; but they are separated from each other by annular divisional spaces. The nozzle end of the innermost cup or air-collector lies within the entrance to the mixing chamber, and comes in front of a vane, fan, or blower C, placed in a recess or chamber. It is rotated by the entering gas sucking in air and gas, and creating a further forced draught and intimately intermingling the air and gas. After being delivered from the fan or blower, the mixture passes up the passages of the U-chamber to the jet at which it is consumed.

The delivery-nozzle of the gas-supply pipe D enters the flared end of the outermost cup of the series; and the gas thence passes successively through the nozzles of all the cups, and into the mixing chamber. Air flows up each of the annular spaces separating the cups, and in succession intermingles with the flowing gas.

Producing Acetylene.—Vaughan-Sherrin, J., of Victoria Street, S.W. No. 26,897; Nov. 26, 1896.

In this arrangement of plant, series of vessels, each containing a charge of carbide of calcium in small pieces, are used as generators of the acetylene; and each charge is exhausted before the next vessel of the series is filled with water. As the bag into which the gas is passed

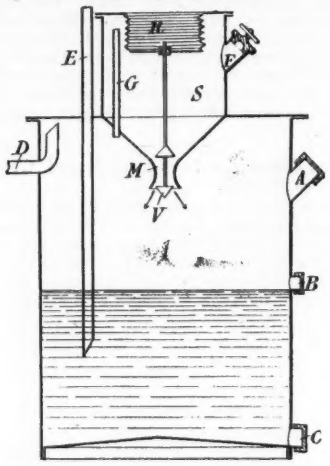


collapses (or the bell of the holder descends), a signal is made; and a fresh carbide vessel is then connected by opening its tap to the water-supply vessel.

In the form of apparatus shown, the carbide containers B are connected by taps to the bottom of the water-cistern A, and are surrounded by the water in a tank L, which is arranged so that it can readily be lowered out of the way of the generators when the latter have to be recharged. The cistern has an air-outlet tap M, and a gas-outlet tap K, which is connected with a collapsible gas-bag O. The bag has a weighted top with ears that, in its descent and ascent (when collapsing and expanding), are guided by rods. One of these rods has a metallic ring Q insulated from the rod, so that when the bag collapses so far as to bring the ear of the top in contact with the ring, an electrical circuit is closed, and a bell is set ringing to advise the attendant that one generator is exhausted, and that the next tap has to be opened to admit water into its generator.

Producing Acetylene.—Thompson, W. P.; a communication from L. L. H. Gérard, of Paris. No. 29,188; Dec. 19, 1896.

This is an apparatus for producing acetylene gas by the fall of crushed carbide into water. It consists of a combination with a receptacle containing the carbide of a flexible or elastic diaphragm, arranged at top in such a way that its lower face is subjected to the variable pressure of the gas produced, and its upper face is exposed to the practically constant pressure of the atmosphere—the diaphragm actuating a rod having two opposed cones or valves, one placed above and the other below the lower orifice of the receptacle containing the carbide.



The apparatus shown in the engraving is composed of a water reservoir, provided with a filling orifice A, a level-regulating orifice B, a discharge-orifice C, a pipe D for drawing off the gas, and a safety-pipe E. A regulator R is arranged at the top of the upper vessel or container S, in which the carbide is inserted by a lateral orifice F. The regulator is composed of a sort of bellows of flexible material, the bottom of which is closed by a metallic plate, to which is fixed a valve-spindle carrying a distributing-valve V and a safety-valve.

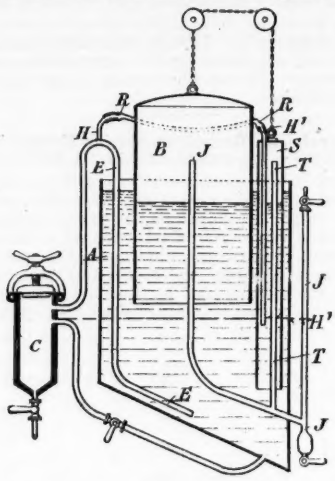
In normal working, the distributing-valve drops slightly below its seating, or point of meeting with the under recessing or narrowing of the orifice M, for discharging the carbide; while the safety-valve remains somewhat raised above its seating, or point of meeting with the upper narrowed part of the orifice, in order to allow the carbide to run away freely round its periphery. When the production of the acetylene gas exceeds the consumption, the pressure increases in the upper part of the reservoir, and is transmitted by a pipe G towards the top of the carbide container, where it acts on the bottom plate of the regulator. It then rises, carrying with it the rod or spindle of the valve, which reduces or stops the discharge of carbide until, on the pressure again diminishing in the apparatus, the plate drops and causes a fresh fall of carbide.

Manufacture of Acetylene.—Résener, P. de, and Luchaire, H., of Paris. No. 29,320; Dec. 21, 1896. Date claimed under International Convention, Aug. 21, 1896.

This invention relates to improvements in the apparatus described in patent No. 24,440 of 1896, in which were explained three different processes, having for their object "the application of the same hydrostatic principle for regulating the flow of water into the carbide receiver."

The present invention consists partly in the addition to the apparatus of a small moveable bell S, of rectangular section, placed between the vessel A and the gas-bell B. This regulator S is connected to the bell B by a chain passing over pulleys, so that it rises when the bell B descends, and descends when the bell rises. The length of the chain is so adjusted that these inverse motions are executed under the conditions necessary to the proper operation of the apparatus—that is to say, "the weight, form, and dimensions of the various parts must be suitably chosen." The upper closed part of the regulator is provided with two pipes H^1 rising slightly above the head, but descending below as far as the level of flow when the regulator has reached the bottom of its downward travel. If, by means of the flexible pipes R, the upper end of the tubes H^1 be put into communication with the small tubes H at the upper part of the pipes E conducting the gas from the carbide-receivers C to the bottom of the vessel A, then, as long as the regulator remains at the lower end of its travel, no water will enter the receivers. But immediately the bell B, in descending, raises the regulator S, the lower end of the tubes H^1 will rise above the level of flow, and the water will enter the receivers in quantity greater according as the regulator is raised higher.

In the normal operation of the apparatus, water runs constantly into the carbide-receivers, in quantity only exactly that necessary according to the consumption of gas; and the bell B remains immovable as long as the consumption remains the same. If the consumption increases, the bell descends; the regulator S rises; and the quantity of water introduced increases. If the consumption diminishes, the bell rises; the regulator descends; and the quantity of water introduced diminishes. The water cannot enter the carbide-receivers except when the gas escapes through the lower orifice of the tubes H^1. This gas is forced into the

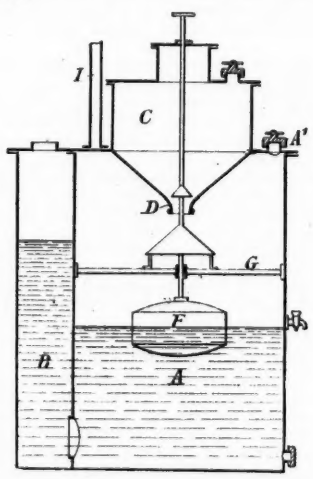


water contained in the regulator; rises to its upper part; and passes into the interior of the bell B through the vertical tube T, or passes away through the pipe J. The small bulb or expansion at the lower end of this pipe serves to receive the water of condensation formed in the pipes.

Producing Acetylene Gas.—O'Brien, J. O.; a communication from P. P. H. Macé, of Paris. No. 29,596; Dec. 23, 1896.

This apparatus for producing acetylene gas consists of an automatic supply regulator, combined with a water-reservoir hermetically sealed and subject to the variable pressure of the gas produced, and communicating with an open reservoir of water subject to the relatively constant pressure of the atmosphere. A float immersed in the water of one or other of these reservoirs commands the supply-valve of the apparatus when in operation.

The reservoir of water A is hermetically sealed, and provided with ordinary arrangements for the introduction and regulation of the level and the withdrawal of the water used. The lower part of it communicates with another reservoir or compartment B (either concentric or not), the upper part of which communicates with the atmosphere. Above the sealed reservoir is placed a receptacle or hopper C for powdered calcium carbide, the conical lower part of which terminates in an aperture D, over which a governing valve is fitted. In order to regulate the movements of this valve, it is mounted on a rod, at the bottom of which is fixed a float F, and is guided vertically by means of a cross-bar G fitted into the reservoir, and by a gland or packing arranged in the cover of the carbide-receiver.



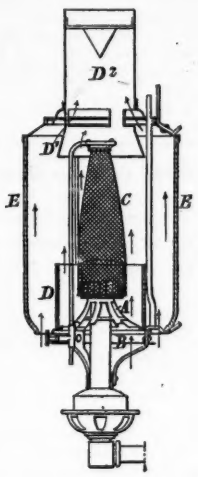
As during working the gas contained in the upper part of the water-reservoir should have a certain excess of pressure to ensure its flowing into the conduits, the height of the water is regulated by an overflow-tap in such a way that it corresponds to the normal working of the apparatus—that is to say, to the moment when, as a consequence of the pressure of the gas, the height of the water in the second compartment B rises to the desired height. The apparatus being thus arranged, when the pressure of gas passing away by the outlet-pipe I is reduced, the height of the water will rise in the reservoir A, and by lifting the float F will allow a certain quantity of carbide to pass into the reservoir. But immediately the gas generated thereby sufficiently raises the pressure, the float falls; and as it descends, it lowers or closes the valve, and stops the admission of carbide.

In order to prevent the carbide, as it drops from the aperture D, falling upon the float, and thereby modifying its weight, there is arranged above the float a cone, which keeps the carbide from coming in contact with the float, and at the same time distributes it uniformly over the surface of the liquid.

To start the machine, the rod carrying the valve extends above the top of the hopper C and terminates in a knob, which can be raised by hand to permit a first fall of carbide. This promptly increases the pressure in the apparatus, and brings the level of the water in the reservoir A to its normal height. It then continues automatically and regularly working, as before explained.

Chimneys for Incandescent Gas-Lamps.—White, E. M., of Philadelphia, U.S.A. No. 19,308; Aug. 20, 1897.

The main object of this invention is "to provide a chimney for incandescent gas-lamps, such that a strong current of air will be maintained, thus increasing the illuminating power of the lamp." A further object is to make the chimney in two parts "so as to prevent the breaking or smutting of the globe owing to any defect there may be in the incandescent mantle."



A is a burner of the ordinary Welsbach incandescent lamp, consisting of a crown, air and gas mixing tubes, air-valve, and chimney-holder B. Secured to a bracket on the chimney-holder is the rod, suspended from which is the mantle C. The chimney is made in two sections D D^1; and above the chimney is a stack D^2. E is the globe, which rests upon the supports of the holder B, and extends to the hood on the upper part of the chimney. The space between the upper portion of the chimney and the hood communicates with the stack or flue D^2; and, as the space within the lower portion of the chimney is open to the atmosphere at the bottom, and the space between the chimney and the globe is also open to the atmosphere at the bottom, and both the upper part of the chimney and the portion between the chimney and the hood are open to the stack, two currents of air are formed—one within the chimney and in contact with the mantle, and the other between the chimney and the globe. By making the chimney in two parts, its breaking is prevented by the jets of flame issuing through perforations in the mantle, as these jets are turned upwards by the outside current, so that they will not come into contact with the globe.

APPLICATIONS FOR LETTERS PATENT.

23,977.—Johnson, W., "Production and use of acetylene gas." Oct. 18.
24,013.—Frossard, J., "Apparatus for lighting and extinguishing gas-jets, chiefly designed for street-lamps." Oct. 18.
24,026.—Lindley, S., F. A., & J. E., "Lamp-frames for public or private lighting." Oct. 19.
24,049.—Cowan, W. & W. H., "Prepayment gas-meters." Oct. 19.
24,077.—Boult, A. J., "Manufacture of calcium and other carbides, and bye-products obtained thereby." A communication from R. Memmo. Oct. 19.
24,082.—Sharp, W. F., "Gas-lamps applicable for outside use." Oct. 19.
24,093.—Bond, C., "Furnaces and gas producers." Oct. 19.
24,106.—Wirtz, W. N., "Incandescent chimney cleaner." Oct. 19.
24,108.—Winterflood, J., "Water-heaters and automatic gas-valve attachments." Oct. 19.
24,116.—Heybrook, F., and Brüggemeier, E., "Glass chimneys." Oct. 19.
24,159.—Glover, R. T. & J. G., and Stagg, W., "Gas-pressure recorders." Oct. 19.
24,171.—Wall, C. H., "Gas-stoves for heating air." Oct. 19.
24,292.—Boult, A. J., "Manufacture of acetylene gas." A communication from L. Meneveaux. Oct. 20.
24,295.—Heal, J. B. & S. H., "Acetylene gas generator." Oct. 21.
24,300.—Kirby, H., and Weintz, H. J., "Acetylene or other gas regulator." Oct. 21.
24,301.—M'Conechy, J., "Production of acetylene gas." Oct. 21.
24,328.—Wilson, J., "Burners for use in incandescent gas lighting." Oct. 21.
24,359.—Collett, A. E., "Chimneys for gas-burners." Oct. 21.
24,360.—Holliday, T., "Acetylene lamps." Oct. 21.
24,373.—Taylor, E. O., "Gas-taps." Oct. 21.
24,387.—Flürscheim, A. A., "Counteracting vibration in gas-lamps." Oct. 21.
24,432.—Mason, J., and Rixson, F., "Water-regulator for heat in gas-engine water-tanks." Oct. 22.
24,446.—Heal, J. B. & S. H., "Automatic acetylene gas generator." Oct. 22.
24,456.—Hollis, H., "Gas gauges or regulators." Oct. 22.
24,488.—Schlatter, R., "Acetylene gas generators." Oct. 22.
24,602.—Mahnke, G., and Kraft, C., "Protection of incandescent gas-light mantles." Oct. 23.
24,611.—Coze, A., "Charging inclined gas-retorts." Oct. 23.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Enrichment of Coal Gas.

Sir,—In his observations upon my recent letter to you, the writer of the article entitled "Notes on the Enrichment of Coal Gas" appears to have overlooked what necessarily follows from my contention—namely, that with adherence to the 5 cubic feet rate when investigating the cost of enriching coal gas with various enrichers, "the poorer the enriched gas so tested, the greater the *apparent* value of the enricher." Enrichment values thus ascertained are about as serviceable as measurements made with an elastic measuring tape.

An investigator, for example, adhering to the Referees' Instructions, ascertains the cost of enriching so-called 10-candle gas to so-called 14-candle gas; and the cost of enrichment per 1000 cubic feet, divided by four, is assumed to be the cost per candle per 1000 feet. A second experimenter determines the cost of enrichment when using 16½-candle gas and raising it to 17½ candles; and he finds that the cost of enrichment per candle is about twice as much as that determined by the first experimenter. The reason for this is that, had the so-called 10-candle gas been consumed with a suitable air supply, it would have been found to be equal to about 14 candles per 5 cubic feet, and the so-called 14-candle gas equal to about 16 candles. Consequently, the quantity of enricher used has only raised the gas 2 candles—not 4 candles—when compared with the 1 candle enrichment from 16½ to 17½ candles; for in the latter case the air supply would be fairly suited to the quality and quantity of gas burned.

Again, an investigator determines the illuminating power of coal gas before and after the eliminating of 3 to 4 gallons of light oils per 10,000 cubic feet, and adhering to the 5-cubic feet rate he finds 17½ candles and 4 candles respectively. He may conclude that the benzene, &c., thus removed contributed 77 per cent. to the total illuminating value of the gas. But were he to test the 4-candle gas with a suitable air supply, as is done in the case of the 17½-candle gas, he would find that it is of the value of about 12 candles; and consequently the benzene, &c., contributed only about 46 per cent. to the total luminosity.

There is no need to multiply examples; but I would point out that if the enrichment value of carburetted water gas as given (*ante*, p. 792) was ascertained with adherence to the Referees' Instructions, it is not likely to agree with results obtained in places where the unenriched coal gas is of a different value. At the same time, I think the writer of the article has done service in putting the comparative value of carburetted water gas upon a truer basis than has been previously done. To compare the enriching value of carburetted water gas, the illuminating power of which had been directly ascertained, with the enrichment value (?) of other enrichers, has been most unjust to this gas. To me the subject of enriching values appears at the present time to be in a state of great confusion, from which it can only emerge when each enricher has been subjected to the same exhaustive treatment as was bestowed upon acetylene by Professor Lewes (*vide* Inst. Gas Engineers, Vol. V., p. 127*).

Birmingham, Oct. 29, 1897. Charles Hunt.

LEGAL INTELLIGENCE.

CLERKENWELL POLICE COURT.—Tuesday, Oct. 26.

(*Before Mr.* Horace Smith.)

A Question of Meter Registration.

To-day The Gaslight and Coke Company were summoned by Mr. F. R. Cresswell, of 235, Camden Road, in order to obtain a magisterial settlement of a dispute which had arisen between him and the Company as to the quantity of gas chargeable to him as having been consumed on the above-named premises between Dec. 14, 1896, and March 12, 1897.

Mr. R. Storry Deans appeared for the complainant; Mr. Horace Avory represented the Company.

Mr. Deans, in opening the case, said the summons was taken out under section 20 of the Gas-Works Clauses Act, 1871, which dealt with gas-meters and disputes between suppliers and consumers as to the quantity of gas burnt. The complainant had a 20-light meter, and at the end of the June quarter of 1896 it showed a consumption of 18,600 cubic feet; for the June to September quarter, 16,600 cubic feet were registered; and for the September to December quarter, 15,200 cubic feet. When the inspector took the index in the March quarter of the present year, he found a consumption of 118,400 cubic feet recorded; while from March 12 to April 14—a month and two days—15,000 cubic feet were registered, or only 200 feet less than the consumption in the entire September to December quarter. The meter was tested, and certified to be 2·46 per cent. fast. The Company were willing to reduce the gas bill of £16 15s. by 13s. 5d. upon this finding, which they contended was absolutely conclusive, and binding upon the complainant, who they said was liable for the balance remaining after that deduction.

His Worship asked if he had jurisdiction to deal with this matter.

Mr. Avory said he had—subject to this, that, if the consumer was not satisfied with the inspector's test, he could have the meter examined by an independent authority. If he did not choose to do that, then, as far as that Court was concerned, the test was conclusive.

Mr. Deans contended that the test was not final, as the section specified that the dispute was to be settled by two justices. A case in point was that of *The Wandsworth and Putney Gas Company v. Rye* an unreported case, but referred to in a foot-note in Stone's "Justices' Manual." Another was that of *The Richmond Gas Company v. Taylor* (*ante*, p. 122). There the Bench ruled that the Act of Parliament made the state of the meter only *primâ facie*, and not conclusive, evidence; and they reduced the amount claimed from £16 14s. to £6 6s. 11d. This was an exactly similar decision to that given by Mr. Paget in the Wandsworth case.

Mr. *F. R. Cresswell* was then called, and bore out the statements made

* See "Journal," Vol. LXV., p. 1067.

by Mr. Deans as to the quantity of gas registered by the meter. He said he could not account for the increased consumption, as his family were away for three weeks, and there was no extra gas—in fact, a great deal less—burnt. The meter being, according to the certificate, 2·46 per cent. fast, he would have consumed rather more than 90,000 cubic feet of gas; and this was impossible. He asked his Worship to find that his consumption was much the same as before.

In cross-examination by Mr. AVORY, witness admitted that he had paid for 104,000 cubic feet for the March quarter of 1895; but he explained that he then had illness in the house. Early in 1896, he complained that his gas-meter was defective, as there was a smell; and the one now in dispute was supplied to him in April of that year. He had about six gas-stoves in the house; and one was burning in his wife's bedroom night and day at times. While the family were away, the house was in charge of two servants, who had strict orders not to use the gas-stoves.

His WORSHIP asked if it was not a fact that everybody's gas bill was higher from December to March than at any other time.

Mr. AVORY said he could prove it was; and in the previous March quarter the complainant's meter was all wrong, and registering slowly.

His WORSHIP asked the consumption in the March quarter of 1894.

Mr. DEANS said it was 86,900 cubic feet.

His WORSHIP (to witness): Do you know the number of stoves going then?

Witness: It was just the same.

This was the complainant's case.

Mr. AVORY said there was a very serious question as to whether the 1871 Act applied to the Company, because it was stated in section 3 that its provisions should apply to "every gas undertaking authorized by any Special Act hereafter passed;" and the Company's Act was passed long before 1871. However, he did not wish to raise a question which might have to be settled by the House of Lords, because he wanted his Worship's decision upon a matter of equal importance to the Company—viz., what was the meaning of the words in section 20, "the register of the meter shall be *primâ facie* evidence of the quantity of gas consumed." It seemed to him to mean that every meter should be assumed to be correct, and that its register should be *primâ facie* evidence that the quantity of gas recorded by it had been burnt. Of course, this could be disputed; and then the meter might be tested. But if, after this had been done, the register was still to be only *primâ facie* evidence which could be rebutted by the statement of a consumer that he did not think he had burnt so much gas as was recorded by the index, then a separate court would have to be set apart for the settlement of these disputes. Having cited the provisions of the Sale of Gas Act, 1859, bearing upon the case, the learned Counsel pointed out that in the present instance the inspector who tested the meter certified it to be 2·46 per cent. fast—that was to say, only 0·46 per cent. beyond the margin allowed by Act of Parliament. Yet, in face of this, his Worship was asked to settle the dispute by finding what was the actual quantity of gas consumed by the complainant in the March quarter. What possible evidence was there upon which he could base a decision on the point? The only tangible fact was that the family were away, and that this afforded the servants an opportunity of setting all the gas-fires burning, and keeping them alight all night to warm themselves. This would account in a moment for the slight increase—14,000 cubic feet—over the corresponding quarter of 1895.

His WORSHIP asked what the March quarter's consumption would be reduced to, allowing for the meter being 2·46 per cent. fast.

Mr. AVORY: You may take off 3300 cubic feet.

Mr. DEANS said that left about 115,000 cubic feet, as against 62,000 cubic feet in 1896.

Mr. AVORY said, with reference to 1896, the explanation of the small quantity registered in the March quarter was that the meter was defective. It was a private meter, and had been 2·91 per cent. slow since 1893. In 1896 it reached the culminating point by leaking. This meter was removed, and a new one sent, which was properly tested before it was fixed, and had since been registering correctly with the exception of the slight difference for which the Company had made allowance. They had done this for the sake of peace, and had gone even farther than they were obliged, as they had made a corresponding allowance for the December quarter of 1896.

Mr. *T. Fenn*, an employee of the Company, said that after the dispute he tried to arrange matters with Mr. Cresswell, and offered to have the meter taken to pieces and tested in his presence; but he declined. In the course of conversation, he said he had used the gas-fires for 45 days and nights, on account of the illness of his wife; and witness then told him that this would make a difference of 50,000 or 60,000 cubic feet in the consumption of gas.

Mr. DEANS cross-examined the witness on this point, with the view of showing that the remark had reference to another quarter. But witness adhered to his statement.

Mr. *J. Stratford* said he had tested the meter in question, and had given the certificate that it was 2·46 per cent. fast. From what he saw of the meter, he came to the conclusion that the quantity of gas shown by the index had passed through; and subject to the allowance of 2·46 per cent., it would be 115,000 cubic feet.

Cross-examined: He believed his test was scientifically perfect, by which he meant that the instrument he used was a positively accurate one. He did not see that anything but satisfaction would be gained by having the meter tested by someone else. He found it "erratic" to a small extent, but he did not have to condemn it, under the Government regulations, except for being 2·46 per cent. fast.

Re-examined: He was quite independent of the Company; holding his appointment as a meter inspector under the Sale of Gas Act from the Justices of the City of London.

Mr. *J. Hunter*, the Senior Inspector of the Company, gave evidence as to the removal of the old slow meter at the request of Mr. Cresswell, and the substitution of the one in dispute.

Cross-examined: When the Company made an allowance to anybody for a meter being fast, it was only for the current quarter; they assumed that the meter was right in the previous quarter. If he had an erratic fast meter, the tendency would be for the defect to increase, not decrease; and if he tested a meter in March or April, 1896, and found it to be slow, he would certainly assume that it had been slow twelve months before. If a meter were slow in 1893, it would probably get gradually slower.

Mr. *J. G. Glover*, the Managing-Director of Messrs. T. Glover and Co., Limited, said meters did not sometimes go fast and at others slow. If a meter were 2·91 per cent. slow in 1893, its tendency would undoubtedly be to get slower. With regard to the one in dispute, which was 2·46 per cent. fast, he should say it was correct when it was put up in April, 1896. In his opinion, it was impossible that the same meter should have been registering in the March quarter anything more than 2·46 per cent. fast. If a meter inspector, having made his test carefully, said a meter was only 2 per cent. fast, that meter could not, under any circumstances, no matter what the pressure might be, register more than this quantity fast. The inspector's test was a perfect one.

This concluded the evidence.

His WORSHIP said he should dismiss the summons.

Mr. AVORY asked for costs, on the ground that the Company had made every endeavour to settle the matter amicably. As far back as April, they made an extra allowance in order to avoid coming into Court.

His WORSHIP said he could not give costs.

Mr. AVORY thought the form of the judgment should be that the allowance made by the Company was correct. If the summons was simply dismissed, the complainant might apply to the Court again, and say the dispute had not been settled.

His WORSHIP: Then I will give judgment in favour of the defendant Company.

YSTRAD POLICE COURT.—Monday, Oct. 25.

(*Before Mr.* IGNATIUS WILLIAMS, *Stipendiary, and other Magistrates.*)

Cutting off a Consumer's Supply.

To-day an action was brought by Mr. T. J. Davies, a printer and publisher at Treorky, against the Ystrad Gas and Water Company, for cutting off his supply of gas on the 29th of September last.

Mr. D. W. JONES appeared for the complainant; Mr. B. St. John WILLIAMS represented the defendants.

The evidence given by the complainant was to the effect that the Company held a guarantee for one quarter's gas. On the 11th of September they gave him seven days' notice that unless he deposited the sum of £2 before the expiration of that time his supply would be discontinued. Complainant refused to deposit this amount, on the ground that he had already given a guarantee to the Company; whereupon the gas was cut off. The defendants' case was that some months ago the complainant entered into an agreement with them to lay a long length of service-pipe to his new premises, which are situated some distance from the road. Under this agreement, he was to pay £4. The account was sent to him; and after the collector had made several applications for payment extending over a period of eight months, notice was forwarded that the Company would sue for the money. Thereupon complainant disputed the agreement; and this having occurred before, they decided that it was necessary for their protection to have security for further supplies. They accordingly applied for it, under sections 11 and 16 of the Gas-Works Clauses Act, 1871.

The STIPENDIARY asked Mr. Williams to show the authority for cutting off the supply.

Mr. WILLIAMS read the provision, to the effect that, in case of the owner of premises failing to comply with the terms of the notice requiring a deposit, the undertakers might if they pleased stop the supply of gas as long as this failure continued.

Mr. JONES: There was a guarantee, and it is in the possession of the Company.

Mr. WILLIAMS said the defendants' clerks had searched the offices, but had failed to find any guarantee. But, even if one had been given, it was in respect of other premises.

The STIPENDIARY said the Bench considered it was a very high-handed proceeding on the part of the Company to cut off the supply. They should have come before the Bench to have the amount of deposit fixed before taking such a step.

Mr. WILLIAMS observed that it was the complainant's duty, and not the Company's, to come before the Bench.

The STIPENDIARY: The Act says either of the parties.

Mr. WILLIAMS said they could not compel Mr. Davies to come to the Court, and they had no power to summon him.

The STIPENDIARY remarked that the Bench desired to discourage such high-handed proceedings in cutting off consumers' supplies of gas in the district.

The Bench, having deliberated for a few minutes, adjourned the case for Mr. Davies to take out a summons to have the amount of the deposit fixed.

Mr. JONES remarked that, as both parties were present, perhaps their Worships would fix the amount then.

The STIPENDIARY observed that they must have consent to do so from the parties.

Mr. WILLIAMS asked the Bench to state that the Company had not acted illegally in cutting off the supply.

The STIPENDIARY said they had not acted illegally with regard to that particular supply, but it was very high-handed procedure.

Mr. WILLIAMS eventually agreed to accept a personal guarantee for future supply.

The case was therefore dismissed; but the Company were refused costs.

The Winding Up of the Para Gas Company, Limited.

In the Chancery Division of the High Court of Justice last Wednesday, a petition for the winding up of the above-named Company, presented by Mr. S. T. Butter, came before Mr. Justice Vaughan Williams. Mr. W. S. Thompson, for the petitioner, stated that since the presentation of the petition a resolution had been passed for winding up the Company voluntarily. But it was suggested that an order should be made for winding up under the supervision of the Court; and to this he was willing to agree. Mr. O. Leigh Clare, on behalf of the Company, said the undertaking had been sold, and practically all that remained to be done was to settle with the purchaser, and divide the money. But some

questions might arise in the winding up which rendered it desirable that it should take place under the supervision of the Court. His Lordship made the order accordingly.

A Question of Employers' Liability.

Before Judge Addison, Q.C., at the Greenwich County Court, last Friday, William Howland, of East Greenwich, claimed £234 from the South Metropolitan Gas Company, under the Employers' Liability Act—being three years' wages—as damages for injury done to his ankle. Mr. Minton Senhouse said the plaintiff's duties were to couple waggons on a railway siding; and while he was engaged in coupling up a train of eight waggons full of breeze and slack on the 16th of February, he slipped on the breeze at the moment the engine was coming down, with the result that the waggons passed over his ankle and broke it. It was contended that the Company were to blame for not providing either brakes or proper scotches to block the trucks on the line. The plaintiff, in consequence of his ankle remaining stiff, was now only able to earn 25s. per week, instead of 30s. as heretofore. For the defence, evidence was called to show that the plaintiff could have employed for the purpose "sprags," or pieces of wood, which were carried so that they might be used as levers. Plaintiff called out "Right" before the engine came on. His Honour said there was clearly a practice in use of scotching the trucks, which defendants should have checked. A verdict was given for the plaintiff for £60. A stay of execution was granted in view of an appeal.

The Rating of the Southwark and Vauxhall Water Company's Reservoirs.

At the Teddington Petty Sessions, on Monday last week, the Southwark and Vauxhall Water Company were summoned by the Hampton Urban District Council for the non-payment of rates, amounting to £137 odd, in respect to their reservoirs. Mr. Courthorpe Munroe appeared for the Council; Mr. W. C. Ryde for the Company. Mr. Munroe said the real point to be decided was whether or not the practice, which had been in operation for some years, of rating the reservoirs owned by the Water Companies at one-fourth their real value, was a right one on which to work for the purpose of assessment. In consequence of a decision given in 1861, the practice had grown up of allowing the Companies to claim that reservoirs, though they were structures which involved an immense outlay, were simply "land covered with water," and as such were only liable to be assessed at one-fourth their real value. The matter had now become one of extreme importance to the local authorities in and around London. At Hampton alone the result of the case meant at the present time at least £300 or £400 a year; and if the works now in progress were carried out, it would mean hundreds more. Mr. Munroe quoted a decision in 1859, which stated that dockyards should be rated to their full value; and he then referred to the decision in 1861, by which Lord Chief Justice Cockburn permitted reservoirs to be rated only at one fourth of their value. He said that one local authority had had courage enough to go to the House of Lords, with the result that the former decision had been re-established, and the latter discredited. He therefore rested his case upon this result. The Council desired to get the case decided in the cheapest and quickest way, and he asked the Magistrates to state a case. Mr. Ryde, for the defence, quoted a decision given in the High Court of Justice, that a filter-bed, even when built on arches, was "land covered with water" for the purpose of rating. And as filter-beds were only intermittently covered with water, *a fortiori* reservoirs, which were permanently covered with water, should certainly be rated at one-fourth of their value. The Chairman said the Bench must decide the case, so far as they were concerned, from a common-sense point of view; and as a company who sold petroleum, and had their tanks let into the ground would be fully rated upon them, so should the Water Company be upon their concrete tanks. They made an order for the payment of the amount claimed, but granted a case for appeal.

A Gas Manager Sentenced to Death and Respited.

At the Central Criminal Court last Wednesday, William Scott Stormonth, formerly the Manager of the Coleraine Gas-Works, was charged before Mr. Justice Ridley with the wilful murder of Sarah Jane M'Lean, and with attempting to commit suicide. To the former charge he pleaded "Not guilty;" to the latter, "Guilty." Mr. C. Mathews, Mr. Horace Avory, and Mr. H. T. Hewitt prosecuted on behalf of the Treasury; Lord Coleridge, Q.C., and Mr. Geoghegan appeared for the defence. The prisoner and the deceased had been staying at a temperance hotel in Guilford Street, Russell Square, under the name of Scott. Both of them had bought quantities of laudanum at various chemists' shops. The woman was last seen alive on the 28th of August. On the following morning, the prisoner left the hotel; and it was afterwards found that he had gone to Derby, where his wife lived. On the 1st of September, the woman was found dead in the bedroom which she and the prisoner had occupied. It was ascertained that she had died from the effects of laudanum poisoning; and there were documents in the room in the prisoner's handwriting, to the effect that the pair had agreed to commit suicide together, but that the laudanum had had no effect on the writer, who meant to "try the river." It was contended for the prosecution that the prisoner must be convicted of murder under the law, which was that, if two people agreed to commit suicide and one of them died, the survivor was guilty of murder. The facts might conceivably bear the construction that the prisoner had no real intention of taking his own life at all. Lord Coleridge urged that there was no evidence that the prisoner persuaded the woman to commit suicide; but there was proof that he had made genuine attempts to do so. Mr. Justice Ridley having directed the jury on the law applicable to the case, a verdict of "Wilful murder" was returned. On the usual question being put to the prisoner, he replied that he was perfectly innocent. His Lordship then pronounced sentence of death; but Her Majesty, on the advice of the Home Office, commuted it yesterday.

MISCELLANEOUS NEWS.

COWES GAS-WORKS ARBITRATION.

Westminster Palace Hotel.—Monday, Oct. 25.

(*Before Mr.* Shiress Will, Q.C., *Umpire.*)

This was an arbitration under an Act of Parliament obtained last session, to fix the price to be paid by the Cowes Urban District Council for the acquisition of the undertaking of the Cowes Gas Company.

Mr. Corbet Woodall, M.Inst.C.E., was Arbitrator for the Company; Mr. E. H. Stevenson, M.Inst.C.E., acted in a similar capacity for the Local Authority.

Mr. Balfour Browne, Q.C., appeared for the Company; the Hon. J. D. FitzGerald, Q.C., and Mr. Colville for the Council.

Mr. Balfour Browne, in opening, mentioned that this was a case of compulsory purchase. Having referred to the proceedings in Parliament leading up to the present arbitration, he said the Company was established in 1846; and down to the time of its incorporation in 1896, the capital consisted of £14,830, of which £13,430 had been issued. By the Act of 1896, the capital was put at £33,430, of which £13,430 was to be called the original capital, and £20,000 the additional capital. Power was also given under the Act to borrow a sum not exceeding £3357 and one-fourth of the additional capital by debenture stock. One important provision authorized the purchase of the site of the gas-works, which were chiefly leasehold; and since then the purchase had been completed. The standard price was put at 4s. per 1000 cubic feet; and the usual sliding-scale was inserted. Cowes had developed very much. In most towns, the consumption rose normally in the winter months about Christmas; but in Cowes, the September quarter—as might be expected from the fact that August was the yachting month—was a very heavy one. This was a great advantage to the Company, because they could work without the enormous margin usually necessary. As showing that the undertaking was a good steady-going concern, Counsel stated that the gross rateable value of the town had increased from £29,612 in 1880 to £41,000 in 1897. The consumption of gas had also steadily increased; the number of supplies being 552 in 1895, and 658 in 1896. The use of penny-in-the-slot meters and of cooking apparatus was rapidly spreading. The population of Cowes in ordinary times was about 8000; but the streets were lighted by oil-lamps. The Council were apparently waiting until they got the works into their own hands before using gas in the public lamps. If they had done as other local authorities, they would have used about 2 million cubic feet of gas a year, which would have increased the annual net revenue by about £200, and have added considerably to the capital value of the concern. This could not, of course, be regarded when estimating the capital value; but it would show, not only that the present revenue was exceedingly secure, but that the revenue would increase in the future because the Council must use gas in a short time for the streets. Then the site of two acres was much more than was actually required, though not more than would be needed in the future; and there was also an excess of plant or works amounting to some 40 per cent., in regard to which a further claim was advanced. Counsel went on to point out that for various objects a sum of £7816 had been spent on capital account, to provide which the banking account had been overdrawn by some £3000, and nearly £5000 had been borrowed. He held that this expenditure was absolutely justified—a fact which he mentioned because the Clerk to the Cowes Urban District Council wrote a letter in August, 1896, in which he stated that if the Company expended additional capital the Council would, if an arbitration became necessary, object to its being added to the price paid for the undertaking. The sum awarded would largely depend upon the amount of the profits that had been made, and whether they were maintainable. The profits in 1894 were £1548; in 1895, £1720; and in 1896, £1951. In each of these years a deduction had been made of £33 16s. 8d. for rent. But now that the site was owned by the Company, that would not be done; so that to the profits of 1896—which were used throughout as the basis of calculations—this sum ought to be added again. The amount—£253 14s. 6d.—deducted in the 1896 accounts for repair and maintenance of works and plant was admitted to be too small. It only worked out at 3½d. per 1000 cubic feet; whereas his witnesses said it should be 5d. Correcting the figure on this basis, the sum to be deducted should be increased to £237 1s. 8d. As to the profits on fittings account—which for 1896 were £12 14s. 4d.—this must be treated on a different footing from the other profits; and upon this figure he put five years' purchase. The important question to decide was the number of years' purchase to be allowed on the profits from the sale of gas; and in this connection he quoted the Act to show that the Court were expressly forbidden to consider that the Company was a statutory one. The question was whether the security of a statutory company was better than that of a non-statutory one. The only uncertainty that could come in, was the possible ousting by a local authority; but this applied to both cases. It might be said that, under the Public Health Act, the local authority might supply gas in its own area, if the district was supplied by a non-statutory company; but, as a matter of fact, this had never been done, save when the local authority bought up the gas concern. Gas stock now yielded from 3½ to 3¾ per cent.; and taking the latter figure, they had a multiplier of 26⅔ years; which, applied to the profits, gave £50,834. To this sum they added £63 for fittings; making the amount £50,897. He added to this a further £4268 for excess works, and the usual 10 per cent. for compulsory purchase. In conclusion, Counsel pointed out that, under the Act of 1897, the Council were to pay to the Company the actual cost of obtaining the Act of 1897. The actual cost was £2529 3s. 9d.; but he did not know how the Umpire would deal with this matter—or even whether it came under the Umpire's jurisdiction.

Some conversation passed between Counsel on this point, in which it appeared that the Council were willing to pay the taxed or reasonable costs, whereas the Company held that the "actual costs," according to the wording of the Act, should be paid. The Umpire expressed doubt as

to whether the point came within his purview; and at his suggestion Counsel on both sides agreed to confer and endeavour to come to an agreement.

Mr. *Samuel Wood*, examined by Mr. BALFOUR BROWNE, said he was a member of the firm of Lass, Wood, and Co., chartered accountants. He had examined the books of the Company, and had prepared from them a series of tables giving particulars of the working of the concern. From these, it appeared that the profit for the year 1896 was £1951 17s. 2d. Up to 1891, gas was supplied to the public lamps. The supply then ceased till 1896, when 50,800 cubic feet were supplied *gratis* to certain of the street-lamps. In June last, it appeared that the capital was overspent by £2708, and there were further unpaid accounts at that date of £5075 11s. 11d.—a total of £7784 11s. 11d.

Cross-examined by Mr. FITZGERALD: As to the £322 charged in 1896 for old mains taken up, he agreed that it was a revenue charge; but it was not properly chargeable to one year. In 1896, the actual price paid for coal per ton was less, and the amount received for residuals more, than in previous years. Two of the contracts for the erection of portions of the new works were dated February, 1897—that would be while the unopposed Bill for the purchase of the works was passing through Parliament. It was not true that since 1887 the consumption of gas had steadily increased.

Re-examined: The mains replaced in connection with the £322 had been down a very long time; and the cost of replacing them should be spread over a number of years.

Mr. *Thomas Newbigging*, M.Inst.C.E., examined by Mr. BALFOUR BROWNE, said the works of the Cowes Gas Company were in excellent order. They were considerably in excess of present requirements; and on the land they now occupied, there was room for further extensions. The site was admirable, inasmuch as all the coal had to be carried by sea, and a fair proportion of the residuals left the island. The retort-house contained 32 retorts, capable of producing 175,000 cubic feet of gas per day. Allowing 20 per cent. margin, there would still be 40 per cent. excess retort capacity. There was a large coal-store, which had been built with a view to future use as a retort-house. Its capacity was 700 tons, or ten weeks' stock; the usual amount being six weeks' storage. The exhausters, condensers, washers, purifiers, and station meters were in still greater excess. The tower scrubber was the only thing not equal to the requirements; the deficiency in this case amounting to 50 per cent. The whole works were well equipped and complete, and so arranged as to be capable of producing gas economically and of a high standard of purity. The excess capacity, save as regarded the tower scrubber, varied from 40 to 70 per cent.; and he had taken it all round as 40 per cent. The distributing mains, 8½ miles long, varied in diameter from 9 inches downwards. He had the road opened in four places, and examined the mains; and he found them in each case in good condition, and laid at a proper depth. There were about 700 consumers' meters; some 150 being of the prepayment kind. He had made a structural valuation of the works and fixed and loose plant, which he put at £19,905. The capital expenditure, according to the account to June, 1897, was £16,138; but to this there had to be added £5400 for contracts for work that had been entered into and for law expenses incurred in obtaining the Act last year. The works had been well managed; and the present charge of 3s. 11d. per 1000 cubic feet for gas was reasonable, having regard to the prices of other companies in the island. The make of gas for the year ending December, 1896, was 20,593,000 cubic feet; and the sale, 18,186,300 cubic feet. These figures would be largely increased in the present year. The consumers, too, numbered 552 in 1895, 658 in 1896, and 710 in the first half of 1897. The growth in gas consumption in the four years ending 1896, was 3,708,300 cubic feet, or 25·61 per cent. This amounted to an increase of 5·87 per cent. per annum compound, which he thought would be maintained and continued. Only half the population were at present supplied with gas, so that there was a good chance of an increase occurring not only in the ordinary way, but also by the use of prepayment meters, and through gas being required for cooking, heating, and motive power. As to the Company being regarded as non-statutory, he could not understand what security a company could have beyond what the present Company possessed. Practically there was little difference between a non-statutory and a statutory company. If there was any difference, it would be amply covered by an allowance of two years in the number of years' purchase. He should calculate the purchase on the 3½ per cent. table, which would give a multiplier of 26⅔ years. He took the profit for 1896 as given in the last witness's tables—£1951 17s. 2d.—and deducted the profit on fittings (to which he should apply a different multiplier), leaving £1939 2s. 10d. To this he added the rent of the land (£33 16s. 8d.), which in the year 1896 had been left out, making £1972 19s. 6d. He did not think sufficient had been expended to maintain the hereditament in a condition to command the rent. The figure of £253 14s. 5d., or 3·35d. per 1000 cubic feet, should be increased to 5d., which would bring the amount up to £83 7s. 3d. more. On the other hand, the charge for repair of meters —0 67d. per 1000 cubic feet—was in excess of the average. This he had reduced to 0·45d.—a difference of 0·22d., or £16 13s. 1d. This left a net sum of £66 13s. 10d. to be deducted from the £1972 19s. 6d., which gave £1906 5s. 8d. as the net maintainable and well-secured profits. Applying the 26⅔ as the multiplier, gave £50,834, which, *plus* five years' purchase of the profits on fittings £63, made £50,897. Adding £4268 for excess works and land, and £5089 for the usual 10 per cent. allowance for compulsory sale, brought out a final total of £60,254. The £4268 he arrived at by taking two-fifths of £10,672, his estimate of the value of works and land.

Cross-examined by Mr. FITZGERALD: He had made no allowance in respect of the £322 spent in the renewal of mains in 1896, because he had raised the estimate of what was required to maintain and renew the works from 3½d. to 5d. per 1000 cubic feet. If the 5d. had been regularly spent, the outlay of £322 would not have been required. His allowance of 5d. under this head was ample. He could not see what necessity there was to go into expensive arbitration proceedings for the purchase of the freehold of the site of the works, when the Company had a lease for 60 years, and when the Bill for the purchase of the gas concern was actually before Parliament. It would not have been wise to telescope the two existing gasholders, and thus avoid the expense of the new one. He did not see that the spending by the Company of some £8000 on capital account affected the present purchase at all. The Council were purchasing the maintainable profits; and this expenditure did not affect these profits. It was necessary and desirable that the money should be spent. A leakage of 10 or 11 per cent. was not excessive in a Company of this kind. He should certainly say the mains were in a satisfactory state.

Tuesday, Oct. 26.

Mr. *Newbigging*, in reply to Mr. STEVENSON, said it had been customary to allow only 1 per cent. difference in valuing a statutory as compared with a non-statutory company. It was only recently that this rule had been departed from. The customary number of years' purchase for a well-secured statutory company was 28½. In the present case he was suggesting 26⅔ years, *plus* a sum for excess works equal to more than another 2 years' purchase; so that he was asking more for this non-statutory company than was usual with a statutory concern. He also considered the shares of a non-statutory company of more value than the stock of the London and North Western Railway Company.

Mr. *Henry E. Jones*, M.Inst.C.E., said the Cowes Gas Company was a sound and improving undertaking, having very good works, with a large margin for development. All the recent additions were, in his view, necessary. The adoption of the prepayment system had resulted in a considerable increase in consumption, which was likely to continue. A moderate charge for gas, as in the present case, was security for the present profit; and the excess works were security for increased profit when the consumption rose. He considered it was very unfortunate for the Company that they had to sell at the present time, because of the probable development that would take place. The consumption of gas was shown—comparing the quarters of 1897 with those of 1896—to be largely increasing. The concern should be valued as a first-class undertaking—at just a little less than if it were a statutory company. Taking two companies in exactly similar circumstances, except that one was statutory and the other was not, the difference in value would be approximately represented by the cost of obtaining an Act of Parliament. He commenced his valuation of the concern with £1951 17s. 2d., the profit for 1896, and added £33 16s. 8d. which had been deducted for rent. With a moderate expenditure on plant, the Company could make £100 a year more from the sale of ammonia than they were now doing. Adding these three figures together gave £2085 13s. 10d. The amount deducted for wear and tear and renewals was insufficient by 1 97d. per 1000 cubic feet. Correcting the allowance in this way—which would bring the total amount under this head to about 6d. per 1000 cubic feet—gave £149 12s. to be deducted, which left £1936 1s. 10d. He considered 6d. per 1000 cubic feet an ample allowance. The receipts from fittings he thought were worth only 5 years' purchase; and he therefore took the £12 14s. 4d. from £1936 1s. 10d., leaving £1923 7s. 6d. The right multiplier in this case he held to be 26⅔ years; and applying this gave £50,007. But to complete the works required a sulphate of ammonia plant, which would cost £400. This left £49,607, to which he added £4961, being 10 per cent. allowance for compulsory purchase, and £64, being 5 years' purchase of the fittings' profit of £12 14s. This made a total of £54,632. Up to now, he had been dealing entirely with income and the value of the income from the existing works; but a further sum could be earned practically without any addition to the works, beyond perhaps a little extension of the mains. He considered these surplus works to be worth, in respect of gasholder storage, which was 69,000 cubic feet in excess of present needs, £2363; and in respect of surplus land, retorts, plant, &c., which were 50 per cent. in excess of present needs, £2533. Adding these figures to the £54,632, brought out his total finally at £59,528 as a fair price to be paid to the Company for their undertaking.

Cross-examined by Mr. FITZGERALD: He considered the cost of coal in 1896 rather high, though it was actually higher in 1895 and 1897, because the price of residuals was very low. The reason he had put the figure for renewals, repairs, &c., in the parliamentary proceedings at a higher figure than 6d. per 1000 cubic feet was because he did not then consider certain points—that the Company had very few coin-meters and stoves, that there was an extra summer consumption, &c. The ammonia in 1896 produced £20, and in the two previous years less. Though the ammonia business was not so profitable as the Company might have made it, that was no reason for depriving them of its benefit in the future. It was true the Company paid 10 per cent. for years, and then had to reduce their dividends; but this, he believed, was when the Council ceased to use gas for public lighting. He arrived at 26⅔ as the number of years' purchase by taking 28½ years as the value of a similar undertaking possessing an Act. He did not base his calculations on what money would produce.

By the UMPIRE: The way to estimate the value of the excess works would be to calculate their worth at the time of full fruition, and then take the present value of that sum.

By Mr. STEVENSON: He claimed for the capitalized value of the profit on sulphate of ammonia because the Company could undoubtedly make that profit.

Mr. *William Halliday*, the Secretary to the Company, examined by Mr. BALFOUR BROWNE, gave evidence as to the site of the works being acquired compulsorily, and as to wages being less in Cowes than in London. About an acre of the land was acquired from the Crown for a nominal price of £5. The sum claimed in the arbitration for the remainder of the land was £2200; the award being £1600, and the costs nearly £350 more.

Cross-examined by Mr. FITZGERALD: In 1896 the Company extended their mains to the village of Gurnard at a cost of £700; but he could not tell what the consumption there was. Before the Act of Parliament was passed, the highest price the £10 shares were transferred at, after the dividend had fallen to 8 per cent., was £15 12s. 6d. Since the passing of the Act, there had only been two transfers for cash; and in each case it was at £16. He had valued other shares for probate at £15.

This closed the case for the Company.

Mr. FITZGERALD, on behalf of the Urban District Council, said it was not true that the consumption of gas was steadily increasing at Cowes; the fact being that between 1887 and 1896 there had been no increase. His learned friend had stated that this was due to the fact that the Council ceased to take the gas. But it was in 1891 that the Council adopted this course; and by that time the consumption had fallen off by over 3 million cubic feet. Though Cowes was increasing in population and rateable value, the gas consumption was falling off, which was probably

due to the high price charged, and to the indifferent quality of the gas. It had been suggested that the Council had ceased taking gas in order to lessen the amount to be paid for compensation. As a fact, this action was taken five years ago, before any question of purchase had arisen, because of the high price and the generally unsatisfactory condition of the supply. One way to ascertain the maintainable profits was to take the capital, £13,430, and calculate the amount of the dividend at the present rate of 8½ per cent., which came out at £1100. To this should be added, if the maintainable profit showed it, whatever further sum might be obtained under the sliding-scale; and this figure, subject to any necessary adjustment, was the proper one to take as the maintainable profit of the year. He objected to the figures for 1896 being used as a basis, because the profit of £1951, as shown in Messrs. Lass, Wood, and Co.'s accounts, was not earned, inasmuch as it included over £300 which was brought as balance from a renewal fund created at the beginning, and terminated at the end, of that year. Further, everything in the shape of expenditure seemed to be lower in 1896 than in other years; while the production of gas per ton of coal carbonized suddenly rose in that year. For this no explanation was forthcoming. Counsel quoted the dividends of a number of companies as given in the "JOURNAL," showing that shares in good statutory companies could be acquired at from 22 to 25 years' purchase; but according to Mr. Newbigging's evidence, this should be reduced by two years for a non-statutory company. On Mr. Newbigging's valuation, the shares would work out at £38 each, against £16 as given by the Secretary. Having adversely criticized the action of the Company in undertaking so much new work after the Council had given notice to purchase, he asserted that the claim advanced by Mr. Jones in connection with the increased profit of £100 on the sale of sulphate should not be allowed. In conclusion, he argued that, in place of the 10 per cent. for compulsory sale, there should be allowed only such an amount as would liberally compensate the shareholders for their trouble in re-investing their share of the award.

Mr. *W. R. Chester*, M.Inst.C.E., in reply to Mr. FITZGERALD, said the works were in fair condition. They were in some respects in excess of present needs, and in others deficient. The present gasholder only held about 69,000 cubic feet, as against a maximum daily make of 110,000 cubic feet; and the distributing plant, seeing that the leakage was about 10 or 11 per cent., evidently was not in a very satisfactory condition. He had the ground opened at several points, and found the mains were shallow and at two places gas was evidently escaping. The outlay on the extension to the village of Gurnard was not wise; the houses being very small. He produced a diagram showing that the consumption of gas was 18,898,000 cubic feet in 1887; and that it sank to 14,478,000 cubic feet in 1892, when the public lighting was withdrawn. Since then it had fluctuated, till it reached 18,186,000 cubic feet in 1896—this being the highest figure since 1887. The price charged by the Company for gas was, he held, much too high. If 1896 had been a normal year, it would have been a fair basis on which to calculate the maintainable profits. But it was entirely abnormal; the make and sale of gas per ton, for some unaccountable reason, suddenly rising 400 cubic feet, the price of coal being 2d. lower than the average of a number of years, and the figure of working expenses being unusually low. Further, a sum of £322 expended on renewals of mains should have been included in that year's accounts. He had therefore taken the first half of 1897 as the basis. He took 7d. per 1000 cubic feet as the figure for wear and tear and renewal of works, which was very near the 6d. allowed by the Company's witnesses, as it included some items which their figure did not. The price of coal, which touched bottom in 1896, was likely to advance still further; and residuals until quite recently had been a perfect drug. The profits for the half year ending June 30, 1897, were £760 13s. 11d., from which he deducted the profit on fittings £9 14s. 4d. (subsequently dealt with), leaving £750 19s. 7d. The next deduction was £54 13s. 6d., the amount of deficiency in expenditure for repairs and renewals of works, mains, services, and meters, at 7d. instead of 5·53d. per 1000 cubic feet, which left £696 6s. 1d. He considered the present price of gas was excessive, and could not be maintained; and allowing for a reduction of 4d. per 1000 cubic feet, gave a further sum of £148 15s. 6d. to be deducted. This left £547 10s. 7d. as the adjusted profit for the half year. By reference to the figures for the preceding three years, he found that the second half of the year represented 54 per cent. of the consumption. Taking the profit for the second six months on this basis, he added £642 15s. 1d. to the £547 10s. 7d., making £1190 5s. 8d. as the net maintainable profits. Applying the multiplier of 22¼ to this sum, gave £26,483 16s. 1d. To this he added £60; being 3 years' purchase of the profit on the fittings, which he put at £20 a year. This brought out a total of £26,543 16s. 1d., which, *plus* £3669 15s. 4d. for surplus works, gave £30,213 11s. 5d. as the total valuation. In addition to this, a sum representing the reasonable cost of obtaining the Special Act was to be paid. There was another view—that to ascertain the maintainable profit, they should start with the idea that 8 per cent. was the maximum dividend, subject to the sliding-scale. He took the existing share capital issued at £13,430, on which they were entitled to pay 8 per cent. when charging 4s. per 1000 cubic feet. They now sold at 3s. 11d., and were therefore entitled to divide 8¼ per cent., which worked out to £1107 19s. 6d. But if the Company reduced their price by 4d. per 1000 cubic feet, they would be entitled to divide another 1 per cent., which represented £134 6s. These two sums made £1242 5s. 6d. Following this calculation out as in the other method, gave a final figure of £31,310 7s. 8d.

Cross-examined by Mr. BALFOUR BROWNE: There was nothing at the works that was not necessary for their completeness. The present works would enable the Company to trade much more economically than in the past. It was not unusual to obtain with good management 10,600 cubic feet of gas per ton of coal, as was the case in 1896; but he doubted the accuracy of the return, as the figures were so much higher than in previous years. He did not think the management was good in that year, and bad in others. The working expenses in 1896 were only 15·62d. per 1000 cubic feet of gas sold, against an average of 18·08d. This was very low, though he could manage the works at a cheaper rate. He allowed nothing for compulsory sale, and was not in the habit of doing so. It was a matter for the Umpire.

By Mr. WOODALL: It was unreasonable to capitalize the expenditure of £33 yearly in rent by spending £1800 or £1900 in the purchase of the land. This might well have been left to the Company's successors; and the same applied to the cost of mains to Gurnard and Stephenson Road. The capital expenditure on the new gasholder might easily have been avoided by telescoping the existing holder, which would have brought the capacity up to the maximum make.

Wednesday, Oct. 27.

Mr. *W. A. M'Intosh Valon*, J.P., examined by Mr. FITZGERALD, gave evidence largely corroborating Mr. Chester's figures. He allowed £573 for surplus works, made up of £400 for margin of retort-house room and coal-storage, and £173 for margin for new condenser. He estimated that the margin of storage of the new gasholder—which would hold 100,000 cubic feet—would be 50,000 cubic feet; and he therefore allowed one-half of its cost (£4853) as excess. This made a total of £3000 allowed for excess works, including those in course of construction. The mains, in addition to what had been done to them recently, still required a great deal of renewing. The amount charged for wear and tear of mains in the years 1894-5-6, averaged only 0·14d. per 1000 cubic feet sold, which was very low. The item of £322 for renewal of mains, in the 1896 accounts, would very considerably reduce the profits for that year, even if adjusted. The bad state of the mains was shown by the fact that the total leakage was about 11 or 12 per cent. A large part of the £873 spent in 1896 on laying mains was absorbed by the Gurnard main, which witness held to be utterly useless. Witness produced an abstract of revenue account for 1896 and the half year to June 30, 1897, and a reconstructed account for 1896 based on figures for 1897. In 1897, the net figure for coal was an increase of 2·78d. per 1000 cubic feet sold; and for working expenses, 2·67d.—a total of 5·45d. per 1000 cubic feet increase in the two items. There was, he found, a difference in the gross profit of 5·31d. per 1000 cubic feet sold in 1897, which, applied to 18,186,300 cubic feet—the gas sold in 1896—made a sum of £402 4s. 8d. This amount deducted from £1951 17s. 2d.—the gross profit for 1896—gave £1549 12s. 6d. This sum, less £87 18s. additional repairs and renewals to bring the cost to 6d. per 1000 cubic feet, left £1461 14s. 6d., from which again he deducted £46 19s. 7d. (being £11 7s. 4d. for rents, £15 18s. 3d. fittings rental, and £19 14s. fittings profit), leaving £1414 14s. 11d. Adding 10 per cent. on 3 years' purchase of this £46 19s. 7d.—viz., £14 1s. 10d.—brought out the adjusted profit for the year as £1428 16s. 9d. Witness proceeded to value the undertaking on the basis of the amount of dividend authorized, and subject to the adjusted profit balance being divided between the consumers and the shareholders in accordance with the Company's Act. The dividend on £13,430, at 8¼ per cent.—the rate authorized by the Act, which embodied the sliding-scale clause—was £1107 19s. 6d. Then by reducing the selling price 3d. per 1000 cubic feet, an extra ¾ per cent. could be divided, which would equal £100 14s. 6d.—together £1208 14s. These two sums subtracted from the £1428 16s. 9d., gave a balance of £220 2s. 9d., which would be entirely absorbed by the reduction of 3d. in the price of gas; the actual sum on the sale of gas being £227 6s. 6d. Capitalizing the £1208 14s. at 22¼ years' purchase, gave £26,893 11s. 6d., to which had to be added £179 12s. 4d. balance of capital account, and £5107 15s. for extensions as per the contracts entered into by the Company; while £2427, on account of deficiency in gasholder, tank and land, had to be deducted. This brought out the total value of the undertaking at £29,753 18s. 10d. He had also prepared an alternative valuation, based on the maintainable profits of £1428 16s. 9d. From this, he took £227 6s. 6d. on account of the reduction in the selling price of gas—leaving £1201 10s. 3d., which, at 22¼ years' purchase, came to £26,733 13s. 1d. Adding £5107 15s. for the new tank, land, condenser, photometer, &c., according to Messrs. Lass, Wood, and Co.'s accounts, and £462 for surplus retorts, &c., gave £32,303 8s. 1d., which, less £2427 for deficiencies, gave the final value as £29,876 8s. 1d. As to Mr. Jones' suggestion that £100 a year could be obtained from the sale of sulphate, witness could not consider a claim for what did not exist.

Cross-examined by Mr. BALFOUR BROWNE: In his calculations, he took the figures of 1897 as normal, and applied them to those of 1896. As to the 10 per cent. which he allowed on the items totalling £46 19s. 7d., he might be right or wrong, but he certainly thought he allowed the full value for them, seeing that they were for tying yachts to the foreshore, rentals of fittings which would wipe themselves out in five years, and fittings profits, for which from three to five years' allowance was ample. The sum he allowed for this £46, worked out at 6½ years' purchase.

Re-examined by Mr. FITZGERALD: It would be absurd to capitalize rent from yachts for using the foreshore as if they were ordinary gas profits; nor did he think it proper to treat rental or profit on fittings in this way.

Mr. BALFOUR BROWNE said he now had the figures in connection with the Gurnard main. The total cost of the main was £700; and the gross rental, about £80 per annum. The quantity of gas consumed through special meters in Cowes, in connection with the Jubilee illuminations, was 25,500 cubic feet, which, at 3s. 11d. per 1000, came to £4 19s. 8d.

Mr. *Halliday*, in reply to Mr. FITZGERALD, stated that there were no mortgage debentures on the Company.

Mr. BALFOUR BROWNE said the works would be handed over absolutely free of any charge. The contracts would all be finished by Dec. 31, the date of the transfer; and though certain money was owing, this would in no way affect the Council.

Mr. FITZGERALD, in summing up the case for the Council, dealt first with the multiplier that was to be applied to the profits. Mr. Newbigging said 2 years ought to be taken as representing the difference in value between a statutory and a non-statutory company. There was no authority for that; nor for the statement that a non-statutory company ran no risk, inasmuch as injunctions might be obtained by local authorities preventing such companies from opening roads. Moreover, in this case the Company would certainly have been subject to the risk of competition by the electric light; the Council having recently obtained a Provisional Order. It was clear, therefore, that there must be considerable difference between the multiplier of a statutory and of a non-statutory company; and it was for the Court to fix this difference. As to which set of figures should be taken as a basis for calculation, he agreed that those for 1896 would be the better, if that year had been a normal one; but seeing that these figures were obviously abnormal, he held that it was better to take those of 1897. Regarding the claim advanced by Mr. Jones for £100, future profits on ammonia, he said no more than that it worked out that £3000 was to be paid for a business which was absolutely non-existent. Applying a rough-and-ready test to the valuation of the

Company's witnesses, he said they were asked to assume that the maintainable net revenue was such as would give 14¾ per cent. on the capital, though the highest dividend since 1892 was only 8½ per cent. If this were so, the Directors last year ought certainly to have reduced the price of gas, in order to secure increased dividends. On the question of surplus works, he urged that the Council's valuers had treated the Company very liberally; for though they had considered the whole of the £1900 paid to redeem the rent, they had not brought in the £200 which Mr. Newbigging admitted was the amount of deficiency in the tower scrubber, and, further, they had treated the whole of the surplus works as if they were coming into operation at once, and had asked no rebate for deferred value. With reference to the allowance for compulsory sale, this was a question entirely for the Umpire, and regarding which there was no statutory guidance. Mr. Newbigging himself had said this allowance was merely to cover the cost of re-investment; and this, Counsel contended, together with any other possible contingency of the same kind, would be amply met by giving between 1 and 2 per cent. In conclusion, he announced that both sides had now agreed upon the figure of £2409 3s. 7d. as the cost of obtaining the Act.

Mr. Balfour Browne, in reply, said they would recollect the attack Mr. FitzGerald made on the expenditure of the Company the previous afternoon. Yet this was followed by a statement by Mr. Chester that nothing had been expended on the works which was not required for their completeness. The concern was being bought on the basis of profits; and the attack on the expenditure for mains, works, &c., was therefore really beside the mark, though if the Company had not expended the money, the Council would have demanded a large deduction for outlays they would need to make. Really the complaint was that the Company did not let their works remain defective, so that the Council might get them cheaper. It was absolutely ridiculous to value the concern half as a statutory and half as a non-statutory one. In the alternative valuation, the Council's valuers limited the dividend to 8 per cent., without the sliding-scale. According to the Act, however, in assessing the sum to be paid by the Council, no regard was to be had to the fact that the Company was incorporated by Act of Parliament. It was illogical and improper to bring this Act in, as had been done, in order to restrict the dividend, and to exclude it when considering the security. Why were the Arbitrators to assume 1896 was, as was contended, an abnormal year? Were not the other years abnormal? He thought they were. For instance, it was said that the working expenses for that year were unduly low; but that they were higher than necessary, was admitted by Mr. Chester. The figure was higher in the two preceding years; and Mr. Chester said he could manage the works at a lower figure than that for 1896. It was grossly unfair to try to compare the half of a year with a year, because, from admitted figures, it was evident that the second half always exceeded the first—the difference in 1896 being 24 per cent. It was obviously unjust, therefore, to apply the figures for the first half of 1897 to cut down the figures for the whole of 1896. The deduction from the profit on account of the reduction of 3d. per 1000 cubic feet in the price of gas in the Council's valuations, again, was grossly unfair. Mr. Chester represented the reduction as eating away profit, without adding anything for the extra consumption, though it was found by previous experience that a great increase of consumption always followed a reduction in price. As to the multiplier to be applied to the profits—which he held should be taken as for 1896—this depended largely on the security. In the Ashford case, Mr. Stevenson, who then represented the Local Authority, agreed to give 24 years' purchase—the Company being a non-statutory one—on account of the security of the income. In that instance, there was security because there was sufficient margin; in the present case there were surplus works, so that there was extra security. Therefore something—he would not say how much—should be allowed in excess of 24 years, especially as this was emphatically a case of compulsory purchase. With regard to injunctions against breaking up roads, he admitted that, legally, a non-statutory company were not as well secured as a statutory one. But, as a matter of fact, they were quite as secure, for there were two or three hundred gas companies at least who were breaking up roads, solely by permission of the local authorities. He believed the only real difference in value arose from the fact that one was quoted on the Stock Exchange, while the other was not; the effect being to give facilities—which would doubtless be of value—to those who purchased and sold its shares. Regarding the 10 per cent. allowance for compulsory sale, the question now was the same as had often been raised. It was to cover the possibility of making greater profits in the future, as well as to recoup the cost of re-investment, &c., to which allusion had been made. They could not consider that the profits might go down; for if this had been likely, his opponent ought to have said the profits were not maintainable revenue. It was the impossibility of ascertaining what would happen that made this allowance absolutely necessary. Mr. FitzGerald contended that there was no statutory authority for it; but that Parliament recognized the allowance, was shown by the fact that in the Housing of the Working Classes Act, the allowance of 10 per cent. for compulsory sale was forbidden. In conclusion, he asked the Court to say that 1896 was not an abnormal year; that therefore it was right to take the maintainable profits for that year, subject to correction for maintenance; that 26¾ years' purchase was right and proper; and that 10 per cent. for compulsory purchase should be given.

The Umpire raised the question whether it would be well for him to inspect the works; but the parties agreed that this was not necessary.

The proceedings then terminated; the Umpire reserving his award.

Reductions in Price.—The price of gas at Castle Donnington has recently been reduced from 5s. to 4s. 2d. per 1000 cubic feet; and the Directors hope that, with increased consumption, they will in the near future be able to make a further concession. The price of gas has been reduced 2d. per 1000 cubic feet at Margate for public lighting purposes. This will make a difference of 2s. 6d. per lamp. The Tipton District Council have reduced the charges for gas used for industrial purposes as follows: 1,000,000 cubic feet and upwards, 1s. 9d. per 1000 cubic feet per quarter; 500,000 cubic feet to 1,000,000, 2s. per 1000; less than 500,000 feet, 2s. 2d. per 1000. The prices to be net, and no charge to be made for meter-rent; the gas not necessarily to be used for engines, but for brazing, lacquering, and welding.

FATALITY AT THE WREXHAM GAS-WORKS.

The Assistant-Manager Suffocated.

On Sunday, the 24th ult., an accident occurred at the Wrexham Gas-Works which unhappily resulted in the death of Mr. S. Hesketh, the Assistant-Manager. It appears that just before nine o'clock the Manager (Mr. T. Walker) smelt a very strong odour of impure gas; and on going to the purifier-house to ascertain the cause, he heard the gas blowing under the purifiers. He immediately took steps to stop gas making, so that the escape might be safely attended to. Mr. Hesketh was then in the yard; and as he appeared to be preparing to raise a trap-door to gain access to the centre-valve, Mr. Walker cautioned him not to do so. He then went to shut off all the valves on the works; and on his return a few minutes later, he found his son (Mr. T. B. Walker) and a stoker named Perrin getting Hesketh out through the trap-door. He was unconscious, and died before the arrival of medical assistance. An inquiry into the circumstances was held by Mr. W. Wynn Evans, the Coroner for East Denbighshire, last Tuesday, when the above facts came out. The first witness called was Mr. Walker, who said the only explanation he could give of the escape was that the oxide of iron in the purifiers had become clogged, and obstructed the passage of the gas. The centre-valve was considered to be one of the best in use, and it was last inspected in the spring of the year. It did not occur to him to suggest that anyone going into the valve chamber should have something round his mouth. Hesketh was a very experienced man; and he went down on his own account. Mr. T. Bertie Walker gave a vivid account of the occurrence. He said Hesketh got two men to open the trap-door, and sent a man for a ladder. Both he (witness) and his father told him not to go down; but Hesketh did not reply—he seemed confident. They all poured water into the seal-box at the bottom of the valve; but it would not go down on account of the tremendous pressure of gas, which simply blew the water back like a fountain. Hesketh then suggested they should get a plug to put in the 3-inch pipe while the gas was escaping. They got some clay; and then witness again told Hesketh not to descend, and suggested a rope. He did not answer, but took the plug, the clay, and a hammer, and went down the ladder. Witness heard him put the plug in and give it two taps with the hammer, after which the rush of gas decreased. Then he heard the plug drop out, and the gas escaped as strongly as before. Witness shouted down to ask if Hesketh was all right; but he received no answer. They then knew he had been overpowered by the gas. Henry Perrin, a stoker, went down the ladder; and while attempting to rescue deceased, he shouted, "Come on, lads." Perrin had hold of deceased; but in his effort to get up, the ladder let go, and he was dragged out. He then lost consciousness. Witness at length obtained his father's permission to go down. Securing a rope round his waist, he descended the ladder, and tried to lift the body, but failed, and was compelled to ascend for breath. The same thing happened in his second and third attempts; but in the fourth he fastened a rope round his leg, and both witness and deceased were pulled up. Witness then lost consciousness. The Coroner remarked that Mr. Walker deserved great credit for what he did. Henry Perrin, the stoker referred to, partly corroborated the foregoing statement. Dr. Palin said when he was called to the gas-works he found Hesketh lying in the yard. He was perfectly cold, and respiration had ceased. He applied artificial respiration for three-quarters of an hour, when he found it useless to continue, as deceased was quite dead. The same means of respiration were used in the case of Perrin, who after an hour's work gradually resumed breathing of his own accord. Young Walker was also affected a good deal, but recovered consciousness much quicker. Perrin was sent to the infirmary. Witness considered deceased died from the fumes of sulphuretted hydrogen, which paralyzed the pulmonary nerve. The Coroner, in summing up, said there seemed to be a mystery as to what was the cause of the excessive pressure. The jury returned a verdict of "Accidental death," passed a vote of sympathy with Mrs. Hesketh and the family, and also expressed their admiration of the bravery displayed by Walker and Perrin in their endeavour to rescue the deceased. Mr. J. Oswald Bury, on behalf of the Directors, expressed the deepest sympathy with the family. He said Mr. Hesketh was a thoroughly practical man, and was highly respected. The Directors had the greatest confidence in him; and they should keenly deplore his loss. They cordially agreed that Walker and Perrin had acted very bravely.

LEEDS CORPORATION GAS UNDERTAKING.

Mr. George Bray Criticizes the Management.

Mr. George Bray, of gas-burner fame, is a candidate for the representation of the North-West Ward in the Leeds Town Council; and one of the "planks" in his "platform" appears to be the improvement of the management of the gas works. At a meeting of the electors last Tuesday, a considerable portion of his address was devoted to this subject; and in view of the position which he occupies in the gas industry, a short report of his criticisms will be of interest.

The city, Mr. Bray said, was not in a good condition regarding the gas supply. They ought at this moment to be having gas at not more than 1s. 11d. per 1000 cubic feet, instead of 2s. 2d.; and they ought, further, to have gas that was less liable to smoke. In making this statement, he did not blame the present municipal management, nor that which immediately preceded it. He wanted to give those authorities credit for the great labour and attention they had bestowed upon their duties. But the system of management was fundamentally bad; and with that system in operation, they could not reasonably hope to have much improvement in the gas supply. The system did not give a sufficient grip on a business which had a turnover of upwards of £300,000 a year. He thought it was a cheese-paring and pettyfogging system—a system which would never be allowed to prevail if it were the property of a public company, or if it were in the hands of a private individual. The Gas Committee, recognizing that they had a big and complicated business to carry on, should have a man with a large experience of great undertakings as their Manager. The Committee ought also to recognize that they, from no

fault of their own, had not the necessary knowledge to manage such a concern, and that they required high-class assistance. He did not wish to disparage those who had the management of the several branches of the gas undertaking; but there was not a man among them who had had the necessary experience to manage the great undertaking to the best advantage, as a united whole. Nothing paid better than a well-paid Engineer, who devoted the whole of his time to his duties. They would remember that the capital of the gas-works was considerably over a million pounds, and that the revenue therefrom was more than £300,000 per annum. He did not know what the salaries were which were paid in connection with the gas-works; but he ventured to state that there was not another gas-works in the country, anything like the size, where such salaries were paid and such services were required. He ventured to state further that no private business of such magnitude was managed at such a price, and that such a price would never secure a Manager of the character they ought to have in Leeds. The importance of having a high-class man would be seen when he told them that an error of construction in the gas-works, or a mistake of policy in manufacture or distribution, might waste thousands, nay, tens of thousands, of pounds. The cost of all such mistakes had to come out of the price paid for gas, which, of course, added to the amount the consumers had to pay for it. As he had stated that the price of their gas was too high, he quoted the prices paid to gas companies in some smaller cities. In Sheffield the quality of the gas was 18 candles, practically the same as in Leeds; and the prices charged were 1s. 10d., 2s., and 2s. 2d. per 1000 cubic feet, according to the quantity consumed. Then the Sheffield Company paid 10 per cent. interest on their capital, while Leeds paid, with sinking fund added, less than 4 per cent. The Newcastle and Gateshead Gas Company supplied 16-candle gas (which was 2 candles less than that supplied in Leeds) at 1s. 8d. per 1000 cubic feet net; and the Company had to pay an average dividend of 9¾ per cent. on their capital. If they added 2d., which it would cost to raise 16-candle gas to 18 candles, the price of Newcastle gas would be 1s. 10d. per 1000 cubic feet, as compared with 2s. 2d. in Leeds. In York the price for 16-candle gas was 1s. 8d., 1s. 9d., and 1s. 11d., without discount. Adding 2d. to bring the gas up to the lighting quality of Leeds, they would then have an average of about 1s. 11d., taking discounts into consideration. What could be done in other cities could be done in Leeds, if like means were adopted. The other important matter which he had mentioned was the somewhat too free smoking character of the gas. This was a matter which had not been sufficiently attended to in Leeds. Some few gas-works in Great Britain had adopted means which had diminished this tendency to smoke; but in Leeds it did not appear to have been thought of. Yet he should imagine that in many cases it was as important a feature as a reduced price would be in the cost of gas. For instance, if, instead of having their ceilings to decorate once in two years, they would last, say, three, that would be recognized as an important matter. They would never procure a coal gas from which, when used for lighting, there would be no smoke; but the present quality could be improved upon. The necessary reforms, he said, could only be carried out gradually. But, of course, the more united the Committee were, the more quickly could reforms be effected; and he should be glad to place his services at the call of the electors, for use by either party which might be in control of the gas-works.

CEARA GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held on Friday, at the London Offices, No. 9, Queen Street Place, E.C.—Mr. Horatio Brothers in the chair.

The Secretary (Mr. T. Guyatt) read the notice calling the meeting; and the report and accounts, the main points of which were published last week, were then presented.

The Chairman, in moving their adoption, said the total expenditure on the manufacturing and trading accounts (omitting the expenses of the London establishment, debenture interest, and exchange) was £2041 in excess of that for the previous year. But against this must be set the increase of £2501 in the sale of gas, and of £1551 in the sale of residual products and fittings—amounting together to £4052. This very satisfactory advance, however, was all but swallowed up by the manufacturing and trading expenditure, and the rise of £1359 in the item of exchange, with some additional charges such as debenture interest, &c. Nevertheless the profit for the year was £375 more than last year, which, under the circumstances, might fairly be termed satisfactory, especially as the new gasholder and other apparatus had not come into effective operation during the year. Regarding the working results, an additional 258 tons of coal had been carbonized, costing £468. The make of gas per ton of coal had increased by 736 cubic feet; and the quantity of gas sold per ton, by 364 cubic feet. The difference between these figures, however, indicated a rise in the leakage, which might fairly be ascribed to the disturbances caused by relaying mains, putting down a new main, and the erection of new apparatus. There was considerable room for improvement in the production of gas per ton of coal and in its distribution; and they trusted this would be achieved in the current year. The Directors had hoped that exchange would have been better; but, on the contrary, it had become worse, and was now reduced to about 7¼d. per milrei of 27d. This affected them very materially, as all the accounts of the private consumers (in which there was such a great increase) were paid in this diminished value of the currency. The outlay on capital account during the year had been £6348; and there was now only a balance of £1500 owing to the contractors. The Directors had trustworthy information that the works were in first-rate condition, and superior to any in Brazil. The Company were now trading with their reserve fund, as the share capital called up and the debentures only amounted to the sums expended on capital. They had, however, power to raise £4710, or £5 per share on the 942 second preference shares issued; but this he did not think they would require in the present year. Altogether, if it were not for the exchange (over which, of course, they had no control), things looked very promising for the current year.

Mr. J. Darell Blount seconded the motion, which was carried.

A resolution was passed declaring a dividend for the six months to June 30 of 5 per cent. on the preference shares, less income-tax, and of 4 per cent. on the ordinary shares, free of income-tax.

On the proposition of Mr. Blount, seconded by Mr. A. J. King, the retiring Directors (Messrs. H. Brothers and F. A. Wallroth) were re-elected; and, on the motion of Mr. A. Skaife, seconded by Mr. J. Wright, the Auditor (Mr. Magnus Ohren) was re-appointed.

Mr. R. L. Andrews moved, and Mr. Ohren seconded, a vote of thanks to the Chairman and Directors; and it was cordially agreed to.

The Chairman, in acknowledging the confidence of the shareholders, remarked that the past year had been an anxious time for the Directors. They had had, and had still, a great many difficulties to contend against; but they hoped to overcome them. They trusted the current year would be a more profitable one than the past; and they had good reason for so hoping, because the expenditure they had made in extending the manufacturing plant ought to result in an improvement. Continuing, the Chairman spoke highly of the services of the Engineer (Mr. T. M'Making) and the Secretary, and moved a vote of thanks to them for their exertions on behalf of the Company.

Mr. Wright seconded the motion, which was heartily passed.

The Secretary having acknowledged it, the proceedings terminated.

BOLTON CORPORATION GAS AND ELECTRICITY SUPPLY.

Separate Committees for the Gas and Electric Light Undertakings.

The Gas and Electricity Departments of the Bolton Corporation will henceforth be governed by separate Committees. This decision was arrived at last Wednesday by the Town Council after a debate in the course of which an attack was made upon Alderman Miles, J.P., who has been Chairman of the Gas and Electricity Committee for a good many years. The question of dividing the departments has been under consideration for some time; and in Committee there have been somewhat lively discussions on the subject. At the last meeting, six voted for, and six against the partition of the Committee; and Alderman Miles, as Chairman, gave his casting vote against the proposed division. Those opposed to him then raised the question at the meeting of the General Purposes Committee, but with no better result. At Wednesday's meeting of the Town Council, the matter was brought forward by Mr. J. Proctor, who submitted an amendment to the Committee's proceedings, which meant in effect that the electric light undertaking should be placed in charge of a separate Committee. He said there were gentlemen on the Gas Committee who had some regard to the interests of the Electricity Department, and were willing to sever their allegiance for the better working of it. He himself had had considerable experience upon the Gas and Electricity Committee, and he thought it was overtaxed. In his opinion, the work of the Committee had been performed in a perfunctory manner, because of the immense business it had had to go through. There was another matter upon which he laid stress. He had been approached by more than one gentleman who favoured the change; but they had voted against the division of the Committee because Alderman Miles was so anxious that the present state of affairs should continue. He could not help replying to the effect that sentimental objections on the part of Alderman Miles ought not to be allowed to prevail against the best interests of the Committee and the Council. Personally, he strongly supported the partition of the Committee, and suggested that the Gas Committee be known as the Gas and Heating Committee, and the Electricity Committee as the Electric and Power Committee. He believed that gas would henceforth be used more for heating than for lighting purposes. So far as electricity went, the labour of the Committee would in the future be much increased; and he believed the work of the Department would be so developed that it would yield a very large profit to the Corporation. He pointed out that towns which had divided the departments found the action a wise one; and if Bolton decided to follow the example, they would only be keeping abreast of the times. Messrs. Smith and Panton spoke in favour of the change; the latter saying there was plenty of work for two Committees. Alderman Miles, in reply, objected to the prominence given to his name in the discussion. He regretted to hear Mr. Proctor say the work of the Committee had been carried out in a perfunctory manner. He denied the statement with all the energy he possessed. It was one which ought not to have been made; and he felt so strongly on the point that he dare not give vent to his thoughts. He added that he had been uninterruptedly on the Gas Committee during the last 23 years; and he assured the Council that there was no more work to do now than there was previously. If the two departments were divided on the ground that the Committee were overworked, he would say it was an unworthy one. He denied that he had endeavoured to get members of the Committee to vote against the division of the Committee. The ground he took in this matter was that he believed sincerely that it would be against the interests of both departments to have them divided. He had come to this conclusion from experience, and from what he had heard respecting other Corporations. He mentioned Bradford in particular. The two departments in Bolton were working satisfactorily together; and he asked: Why disturb them? They had done their work well; and now, when they were within measurable distance of securing the fruits of their labour, members of the Council were ready to take them away. It was neither generous nor just. When the proper time came for a division, he as a member of the Committee would willingly give way. On a division being taken, 30 voted for the Electricity Department being managed by a separate Committee, while 23 were against the proposition.

During the sitting, Mr. Melling called attention to certain payments to firms on account of prepayment meters, and asked if it was right that Alderman Miles, who was Chairman of the Gas Committee, should vote on the matter, seeing that he was a Director of Meters Limited, which had absorbed the firms in question. The Mayor (Sir B. Dobson) said it was generally known that to be connected with a company such as the one named did not convey any onus, but was simply confined to private interests. The Chairman of the Gas Committee had no disability as regarded the Company. They could do business with the Corporation without bringing Alderman Miles within the law of disability. Mr. J. Taylor asked if it was a wise thing on the part of Alderman Miles to accept the position of a Director of Meters Limited. The Mayor replied that he had nothing to say about that. The discussion then dropped.

THE FALMOUTH CORPORATION AND THE GAS AND WATER WORKS.

Two meetings of the Falmouth Corporation have been held to consider what course shall be taken in reference to the statutory meeting of ratepayers to authorize the promotion of a Bill in Parliament for the purchase of the gas and water works. At the first meeting, held last Friday week, Mr. H. Liddicoat, who presided, said that members of the Town Council were quite willing to bear the expense of advertising the meeting, so that it might not involve any cost to the ratepayers. Dr. Banks proposed that the Town Clerk be instructed to convene a meeting of the ratepayers under the Borough Funds Act. Mr. Grose, in seconding the motion, repudiated the suggestion that this was "Mr. Grose's scheme." He did not want to punish the Water Company, but at the same time he did not think the Corporation could do wrong in pressing them. There was an amount of wealth in the gas and water undertakings. Dr. Banks asked whether the Corporation would be able to proceed with the purchase of the water-works, and drop the proposal as to the gas-works, if public feeling was found to run in that direction. Mr. Webber suggested that the Town Clerk should put the question to the Parliamentary Agents, and obtain a definite reply. Mr. Bowles said he had always been in favour of purchasing the water-works; but the gas-works was a different undertaking, and ought to be dealt with separately. The governing body of the town could better arrange for the supply of pure water than any company existing for the payment of dividends. The ratepayers had been unduly alarmed about the quality of the water. There was no reason to believe that it was injurious to health; but the Corporation should lose no time in getting it filtered. This was of more importance than the promotion of an Act of Parliament for the purchase of the works. The resolution was carried; four members voting for it, and one against, while four remained neutral.

At another meeting, held on Tuesday evening, Mr. Bowles suggested that, in order to avoid confusion, the conduct of the proceedings should be placed in the hands of gentlemen who had devoted most time to the consideration of the question, and that it should be understood that, in any event, there would be a poll. There were three issues—viz., the purchase of the gas-works only, the purchase of the water-works only, and the purchase of both; and besides this there was the question whether this was the most suitable time. Was it intended to promote a Bill next session? Mr. Liddicoat replied that the decision of the ratepayers' meeting would guide the voting at the statutory meeting of the Council. The Town Clerk said there must be another meeting of the ratepayers after the statutory meeting. Mr. Bowles thought it would be a mistake to rush the scheme. He had no vote in the Council as to the purchase of the gas-works; while as to the water-works, he was in favour of the purchase, but not this session. It would be well to spend six or nine months on the preliminaries; and they might then ascertain the price, and see if Penryn was willing to join them. The Mayor (Alderman Deeble) said that if people were half-hearted about it, he would prefer to see the whole thing dropped. He supported the purchase of the gas-works because it would yield a profit for the benefit of the water-works. Dr. Banks thought it would be a tactical mistake to keep the gas and water together in bringing the matter before the ratepayers. Suggestions were made as to the selection of speakers in support of the scheme at the meeting of ratepayers; and the proceedings closed.

NAPHTHALENE DEPOSITS AND DEFECTIVE SERVICES AT HUDDERSFIELD.

Some newspaper correspondence has been going on at Huddersfield, between Mr. B. Shaw, a member of the Gas Committee of the Corporation, and a Mr. Bradley, upon the old question of naphthalene deposits, obstructed service-pipes, and defective lighting. Mr. Shaw, in the course of an address to his constituents, alluded to the numerous complaints made in regard to the quality of the gas, as well as to its inadequate supply owing to obstructed services. It is to be presumed this condition of things had been attributed to the oxy-oil gas process; for Mr. Shaw declared that naphthalene was found in the Huddersfield pipes before the introduction of that gas, and that it was met with more or less in all gas-pipes throughout the kingdom, and in all coal gas not mixed with oxy-oil gas used as an enricher. He put the blame upon the service-pipes, and quoted the former Manager (Mr. W. R. Herring) to the effect that Huddersfield had the worst system of services in the country. Mr. Bradley, in criticizing Mr. Shaw's speech, on the other hand, attributed all the trouble to naphthalene. He acknowledges that the presence of a small quantity in the service-pipes is no detriment, so long as the amount deposited is less than that carried forward with the gas in the form of vapour at the normal temperature. So long as these conditions are maintained, he says the gaslight is improved, where ordinary open burners are used, by its enrichment with the hydrocarbons. Overstep this line, as he maintains has been done at Huddersfield since the oxy-oil process has been adopted, and the difficulties of naphthalene deposits surely make themselves known to the gas manager if to no one else. He goes on to say that the process was adopted so as to reduce the cost of production and improve the quality of the gas; and he saw a published statement that Huddersfield was effecting an annual saving of £11,000 by its use. But what were the actual facts? Its use had caused such an increased amount of naphthalene that the mains and service-pipes were rapidly becoming useless. He thinks that if a chemist were consulted on this matter, he would be able to prove whether or not the naphthalene trouble was increased by the oxy-oil process. In his own opinion, which he says is concurred in by others—including a practical gas manager—it would be hard to find a more effective method of producing it. Mr. Shaw promptly replied to his critic, whom he charged with having misrepresented him. He said: "I asserted that wherever our gas had an ample, free, and unrestrained passage in the pipes, if the burners were not deficient, there was invariably a good light; that whenever a complaint was investigated, it was generally found to be caused by very old pipes eaten away by, and choked up with rust, or some other curtailment of the free flow of gas; and that many of our gas-mains, laid twenty or thirty years ago, in districts where at the time the population was scanty, had, simply by the increase of population, become quite inadequate for the present supply, though at the time they were laid they were adequate. I will here state another opinion, which is that, in many cases where the stoppages have been caused by deposits of naphthalene, no inconvenience would have ensued had the pipes been in good condition and free from rust, for it must be obvious that a deposit that would not prevent a sufficient passage in a good and ample pipe, would completely choke up one attenuated by rust or other stoppage. We must remember that fifteen or twenty years in the life of pipes is productive of a great deterioration in their condition." Mr. Shaw cited a few examples, one being that of Mr. Bradley himself. This gentleman's pipes were very defective; and when the Gas Department declined to continue attending to his complaints, he instructed them to put in a new pipe. This was done; but he declined to pay for it, on the ground that it was the quality of the gas that was at fault in the first instance, and not his pipe. Curiously enough, though improvement in his gas supply was coincident with the alteration of his service-pipe, he persisted in blaming the gas. Dealing with the naphthalene trouble, Mr. Shaw gives extracts from the reports of proceedings at meetings of gas managers, including a statement by the present Gas Engineer of the Huddersfield Corporation (Mr. E. A. Harman), to show that it is by no means restricted to the Yorkshire town. He leaves his opponent to ponder over the facts cited, and to continue the discussion alone if he wishes to do so.

BRADFORD CORPORATION GAS AND ELECTRICITY DEPARTMENTS.

Annual Report.

The statements of the Chairman of the Gas and Electricity Committee of the Bradford Corporation for the past two half years have already been reported in the "Journal;" but the Committee have now issued a report for the complete year ending June 30, from which we take the following figures: During the twelve months 161,809 tons of coal and cannel were carbonized, from which were produced 1,682,674,000 cubic feet of gas, 65,859 tons of coke for sale, 10,163 tons of tar, and 23,864 tons of ammoniacal liquor. No less than 536 cooking-stoves and gas-fires were sold; being 86 more than in the previous year, and making a total of 8735 sold since the opening of the stove department in 1884. There are now on hire 482 cooking-stoves, compared with 451 in 1895-96; and 141 were supplied on the hire-purchase system, as against 88. There are now 787 two-light incandescent lamps and 43 two-light Bray's lamps in the borough, of which 22 incandescent and two Bray's lamps are in the out-districts. The number of single-light incandescent lamps is 149; and the number of ordinary lamps is 6866, of which 605 are in the out-districts. The total number of lamps in the city is now 7845; being an increase of 166 during the year. The sulphate of ammonia manufactured was 2287 tons, against 2165 tons in the previous year. The average gross price obtained was £7 5s. 6d., compared with £8 4s. 6d. in 1896, or a decrease of 19s. per ton. There were 2213 tons of sulphuric acid produced, of which 1697 tons were used in the manufacture of sulphate of ammonia. The production in the preceding year was 2063 tons. There were also manufactured 24 tons of muriate of ammonia, 181 tons of copperas, and 37 tons of Glauber's salts.

With regard to the electric supply, all consumers are now supplied at a pressure of 230 volts; and the balancing on the three-wire system at 460 and 230 volts is completed. The chief advantage of this change (say the Committee) consists in being able to supply twice the number of lamps from the same mains with no further loss of pressure. The other advantages of this important change of pressure are: (1) The area of direct supply is increased from 1½ square miles to 9 square miles; and (2) the voltage is suitable for the supply of electricity for tram-car traction if required. A free supply of incandescent lamps to all consumers of electricity for incandescent lighting from the Corporation supply mains has been introduced, and is now in successful operation. In order, too, to encourage a demand for electricity in the daytime, it has been arranged that a certain class of electrical apparatus shall be let out on hire. This arrangement has only been in operation nine months, and 39 motors and 62 arc lamps have been already applied for. These motors have proved an excellent advertisement in themselves, and are rapidly increasing the day load at the works. The price of electricity for motors has been reduced from 3½d. to 2½d. per unit. Twenty-one miles of cables have been laid during the year; being equal to seven miles of one side of a street.

SIR HENRY LITTLEJOHN ON CARBURETTED WATER GAS.

Sir Henry Littlejohn, the Medical Officer of Health for Edinburgh, has prepared the following report on the use of carburetted water gas for domestic purposes:—

"The poisonous properties of ordinary coal gas are chiefly due to the presence of carbonic oxide gas; and while happily the fatal accidents from poisoning by coal gas are in Edinburgh comparatively rare, yet the occurrence of leakage from defective house fittings, or pipes and street mains, are by no means so uncommon in our large towns as is attempted to be made out by the advocates of the introduction of carburetted water gas. This gas contains a still larger amount of carbonic oxide than coal gas; so that a mixture of these gases, as is proposed to be supplied, will very considerably increase the proportion of carbonic oxide, which is one of the most poisonous gases known, and will thus add to any danger already existing from the escape of gas into houses. So far as the public health is concerned, this danger is the question with which I have to deal.

"While I am aware that the use of carburetted water gas has largely increased of late years, and that it is supplied in many towns throughout the country in varying proportions, it is impossible to deny that as the proportion of carbonic oxide in our lighting gas is increased, the danger of poisoning from an accidental escape of gas is much greater. It is stated that carburetted water gas has at least as distinct an odour as

ordinary coal gas, and that, therefore, any accidental escape would be as noticeable as in the case of the present gas supply. This may be so; but it must be remembered that the mixture of gases is more poisonous, and that, though the sense of smell may be able to detect a much smaller proportion of the deleterious gas than would be dangerous, yet in the case of persons asleep this safeguard would be lost. The cases of poisoning which have been reported very rarely occur during the daytime when people are awake and moving about, but generally during the night, from some accidental escape into the room, when the inmates are asleep.

"It is proposed that the mixture to be supplied in Edinburgh shall contain on an average 14·49 per cent. of carbonic oxide—an amount considerably lower than is met with in many towns where carburetted water gas is employed for lighting purposes. While I do not wish to exaggerate any possible dangers which may result from the use of this gas, I am strongly of opinion that it should be kept in mind that the mixture proposed to be supplied will have distinctly more poisonous properties than the gas at present in use, and that any risks that exist from the escape of gas in houses will be increased. Under these circumstances, it is a matter for consideration whether certain precautions and restrictions should not be adopted and enforced as a safeguard to the public against the possibility of risk. I am led to understand that carburetted water gas is more easily and also more quickly produced than ordinary coal gas. Hence, the temptation may exist during certain periods of the year, when the supply of coal gas is deficient, to increase the proportion of carburetted water gas above the quantity indicated by the Commissioners. This would, of course, tend to increase the danger that may arise from defects in pipes and fittings; and, in my opinion, a distinct guarantee should be obtained as to the maximum amount of carbonic oxide which shall be present in the gas supplied at any time to the inhabitants. Again, scientific men have not finally determined the important question as to how the mixture of the gases takes place—whether the mixture is at once effected of an intimate character, or whether the two gases are not first distributed in layers or strata before thorough mixing takes place. It thus might happen that undue haste in drawing off the gases might lead to a very large proportion of carbonic oxide being supplied.

"The second point which appears to me to require consideration is the condition of the various fittings in the houses throughout the city. It must be within the knowledge of the Health Committee how frequently an escape of gas occurs in connection with water-slide chandeliers, or when the gas is turned very low, from the action of the meter or from the accumulation of water in the pipes. From my own official experience, I know that, especially in the poorer class of dwelling-houses, defective fittings are by no means rare. It must also be remembered that of late years gas appliances in the shape of domestic fires and cooking apparatus have increased very much; thus adding considerably to the risk of gas escaping, owing either to carelessness or to the presence of defects in the apparatus. It comes to be a question, therefore, whether the fittings in houses throughout the city should not be subjected to a thorough overhaul and testing before a gas which is admittedly of a more poisonous character than ordinary lighting gas is introduced. At present the gas supply is subjected to periodical testing to determine its illuminating properties. I would beg to suggest that the City Analyst should, in addition, report on the amount of carbonic oxide present. With sound fittings and the proportion of carbonic oxide gas not exceeding the amount proposed by the Commissioners to be present in the mixture, I cannot see that any strong ground exists for apprehending risk to the health of the community."

At the request of the Health Committee, Sir H. Littlejohn instructed the City Analyst (Mr. J. Falconer King) to report on the constitution of the lighting gas supplied to Edinburgh, more especially as to the proportion of carbonic oxide. He made four analyses, in July last; and they showed the following percentages of carbonic oxide:—

July 6	9·8 per cent.
„ 9	9·1 „
„ 13 and 15	9·0 „

ELECTRIC LIGHTING NOTES.

The Middleton Town Council last Thursday adopted the minutes of the Gas and Electricity Committee, which recommended, among other things, that £18,500 should be borrowed on account of the electric lighting works.

Major-General Crozier held an inquiry at Bradford last Tuesday relative to an application by the Corporation to the Local Government Board for sanction to borrow £50,000 for electric lighting extensions. It was explained that of this sum no less than £37,500 was required for new mains and £4000 for meters. This addition will bring the borrowing powers on the electric lighting works up to £120,000.

At a special meeting of the York City Council held on Monday last, the Electric Light Committee recommended the Corporation to undertake electric lighting, and to apply for power to borrow £20,000 to carry out the work. The report was adopted—26 voting for it, 7 against it, and 7 were neutral. The scheme has been prepared by Professor Kennedy, and will be carried out in conjunction with a rubbish destructor.

Last Tuesday an inquiry was held at Wolverhampton by Colonel C. H. Luard into an application by the Corporation to the Local Government Board for power to borrow £9000 for electric lighting purposes. The Town Clerk (Mr. Horatio Brevitt) said the original loan in respect of the electric light was £30,000; but it had been exceeded by £882, which formed one of the items of the proposed loan. Of the remainder, £5330 was required for buildings and plant; and another portion for the extension of the service to Chapel Ash, and an additional sub-station.

A Local Government Board inquiry was held at Harrogate on Wednesday by Major-General Crozier respecting an application by the Corporation for permission to borrow £17,500 for electric light extensions. According to the evidence, the installation was put down in the early part of the year; £25,246 being borrowed for the purpose. A portion of the centre of the town has been lighted; but it is impossible to comply with further applications for the light without adding to the plant. At present there are in use 7366 8-candle power lamps.

A reliable light for night use must be of the first importance in such places as infirmaries and hospitals; but such a light the Board of Management of the Manchester Royal Infirmary do not possess. At their meeting on Monday last week, it was reported that all the electric lights in the building went out at 3.35 the previous Saturday morning; and the supply of current was not resumed until close upon three hours later. The night porter, on making inquiry as to the cause at the electric light station, was informed that an electrician had had to be sent for to remedy the defect. Under these circumstances, the House Committee of the Infirmary have passed a resolution that the attention of the Corporation Electric Light Department be called to the serious danger and inconvenience caused by the sudden and prolonged failure of the electric current on the night in question, and to the statement that there was no electrician on the spot to remedy the fault.

The Shipley District Council were seriously urged by Mr. J. Midgley last Tuesday to take into consideration the question of adopting electric lighting, and for that purpose to appoint a Committee to inquire into the question and to consult an expert. At present, he stated, the expenditure incurred in lighting the streets was £2200; and he seemed to be afraid that, unless the Council took some steps in the matter, they would be forestalled by private enterprise. While seconding the motion, Mr. Miles Rhodes hoped that the Council were not going to substitute electricity for gas in the whole of the public lamps, for he feared this would launch them in a heavy expenditure. He also considered that it would only have been fair to the Gas Company to have waited and seen if they were prepared to make any concessions to the public before anything were done which might be thought to throw odium on the Company. It was remarked by the Chairman (Mr. C. B. Shaw) that the Directors were going to fix an early date on which to meet a deputation from the Council. The speakers who followed did not appear to be altogether convinced of the wisdom of going in for electric lighting; but on being submitted to the vote, the resolution was carried.

Last Friday, a special meeting of the Weymouth Town Council was held to consider the subject of the electric light. The Council having in July last decided to apply for a Provisional Order to enable them to supply this illuminant for public and private purposes, it was necessary to confirm the resolution. A few days before the meeting, however, a communication was received from Mr. L. Chave, representing a Syndicate who have given notice of their intention to make application for an Order; and they agreed to insert therein a provision enabling the Corporation to purchase the undertaking at any time after ten years, at the actual outlay, with a bonus of 15 per cent. In other words, estimating the outlay to be £20,000, the Corporation would purchase at the expiration of ten years at £23,000. In view of this fact, Mr. Milledge brought forward an amendment to the effect that the application of the Syndicate be not opposed, provided clauses were inserted protecting the Corporation, as suggested. This was not supported; and it was thereupon decided that the Council should proceed. Mr. Milledge then proposed—"That this authority take steps to confer with the Electric Lighting Syndicate with a view to clauses being inserted in the Provisional Order about to be applied for by the Syndicate protecting this authority." Two amendments were submitted; but eventually the motion was withdrawn, and it was resolved to appoint a Special Committee to report on the best methods of lighting the town by electricity.

Mr. H. J. Menzies, the Chairman of the St. Pancras Electric Lighting Committee, has been taking up the cudgels on behalf of that extraordinary body, and trying to prove that, instead of the £500 net profit for the half year being only some 10s. per cent. per annum on the £190,000 invested, as stated in the "Electric Lighting Notes" in the "JOURNAL" for the 5th ult., this sum really represents something to be proud of. He says: "If the concern were in the hands of shareholders, they would have £5300 net available for a half-year's dividend on the £190,000 they had sunk, or 5 per cent. per annum. We are more fortunate. . . . Out of our £5300, the interest on this has been duly paid, a proportion of the loan equal to depreciation has been returned, an old adverse balance wiped out, and we are left with £500. Pray, upon what sum is that the interest? Not, surely, on £190,000 over again, for its demands have been already deducted. If it is net profit, it is such on a capital outlay of nothing; and my arithmetic fails to compute the percentage of so vast a return." It is to be hoped that the ratepayers will appreciate this argument as they read their reports of Wednesday's Vestry Meeting, when £486 was paid to the London County Council for instalments of, and interest on, loans on the King's Road station, and £72 on the Regent's Park station. With these continual drains on the undertaking, it is small wonder that a consideration of the proposed extension of the arc street lighting to the northern boundaries of the parish was postponed till the next meeting.

The Electricity Committee of the Manchester City Council have lately been enjoying a tour on the Continent with the object of inspecting the electric lighting plant in various towns. As a result of their visit, they have actually learnt that electric current can be transmitted long distances, without much loss, by several systems. Having gained this important piece of information, they last Wednesday recommended the Council to take steps to acquire a site for an additional generating station, where land was cheap and water convenient for condensing purposes—this station to be utilized both for lighting and traction purposes. Supporting the Committee's proposal, Alderman Higginbottom said an additional generating station was needed, apart altogether from any prospect of having to use electricity as the motive power for the tramcars; and as land was so dear in the centre of the city, the Committee proposed to go somewhere in the outskirts. The site of the present station cost £60,000; and this constituted a very heavy charge. In the outskirts land would be cheaper; and from the new station the electric current could be transferred at high tension to various centres, from which it could be distributed to the places where it was needed. The Committee had not yet fixed upon a site for the new station; but the work was absolutely necessary, on account of the demand for the electric light. The Committee were in the unfortunate position, owing to the dispute in the engineering trade, of not being able to supply the current this winter to any new places. Plant designed to supply 50,000 additional lamps would not be ready before January. The new arrangements would enable the Committee to supply electric force needed for the tramways to Stockport, Swinton, and other districts. The report was adopted, as well as a recommendation that the arc lighting in the streets should be extended.

THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

The Administration of the Metropolis Water Act, 1897.

At the meeting of the London County Council to-day, the General Purposes Committee will present the promised report on the Metropolis Water Act, 1897. After epitomizing the provisions of the Act, they say that they and the Public Control Committee both deal with questions of water supply; but the administration of the Act is not wholly covered by the orders of reference to the Committees. The Water Committee are to prosecute and conduct all needful inquiries and negotiations relative to the supply of water or to companies supplying water in or near London, and to consider the steps to be taken for acquiring the undertakings now supplying London, or for providing a new supply; and they are to have power to incur expenditure in relation to these inquiries and negotiations. To the Public Control Committee has been entrusted the provision of a constant supply of water, under the Metropolis Water Act, 1871. Both Committees have expressed their views on the question of referring the Act to one or other Committee. The Public Control Committee consider that the Act should be referred to them, inasmuch as hitherto they have exercised the powers conferred upon the Council by the Metropolitan Water Act, 1871, in virtue of which they have arranged for the constant supply to be gradually extended to the whole of London, and have taken active steps in obtaining evidence against several Water Companies of failure to maintain constant supply. The Water Committee, under their order of reference have dealt generally with the London Water Question in all its aspects, and have made themselves acquainted with the various questions arising from time to time with respect to the charges of the Companies. The Committee have conducted an inquiry into the quality of the water supplied, and have considered the matter of the quantity of water per head necessary for London and the quantity now delivered by the Companies. On these grounds, they are of opinion that the new Act should be included in their order of reference. Having considered the opinions expressed by the two Committees, the General Purposes Committee have come to the conclusion that the duty of advising the Council to take action upon the various questions that may arise under the new Act would fall more properly to the Water Committee than to the Public Control Committee, and that the Act should therefore be referred to the former Committee. They point out that, if this course were not taken, the order of reference to the Water Committee would require considerable revision, as it would appear desirable that the Committee entrusted with the new Act should be charged with the duty of investigating generally the condition of the water supply, and this duty now constitutes one of the features of the work of the Water Committee. They therefore recommend to the effect that all questions relating to the Metropolis Water Act, 1897, shall be referred to them.

Bridgend District Council and the Gas and Water Works.—The Bridgend District Council last Tuesday evening decided to promote a Bill in Parliament for the acquisition, compulsorily or otherwise, of the Gas and Water Company's undertaking.

THE EPIDEMIC OF TYPHOID FEVER AT MAIDSTONE.

Restoration of the Constant Supply—Analysis of the Water.

The efforts of the Maidstone Water Company to restore a constant supply of water to the town after the recent serious interruption were crowned with success early last week; and it is satisfactory to find the inhabitants have co-operated with the Company's officials in checking waste. The result was that not only was there sufficient water for domestic use, but some was available for flushing purposes. The Directors decided to complete last week the sterilization of the mains in the high-lying districts of the Farleigh area of supply. These were not reached by the disinfecting solution which flowed from the reservoir on the night of the 16th ult., in consequence of the bursting of a hydrant. At a special meeting of the Urban District Council on Wednesday, the Medical Officer of Health (Mr. M. A. Adams) reported that he had analyzed the present water supplies of the town, and, having regard to the time of year, had come to the conclusion that all were good and wholesome. Dealing with the typhoid epidemic, he said that one of the chief obstacles to the final disappearance of the disease were the foul hand-flushed closets and the foul house drains of the town. As a matter of duty, he had year after year for the past twelve years pressed upon the Council's attention the deplorable condition of the house drains of Maidstone. The sewerage system of the town could by no possibility be made to work satisfactorily without an adequate water supply properly applied. A report which he presented to the Council in 1892 showed that there were somewhere about 6000 dwelling-houses in the borough, more than 4000 of which had closets attached to imperfectly-flushed drains; constituting to all intents and purposes nothing less than elongated cesspools, emitting disease-provoking vapours. In 1895 he reported that much complaint had been made of the street ventilators; and he then expressed the opinion that when effectual flushing of every water-closet and tributary house drain was rigorously enforced, the ground for such complaint would completely disappear. At the same meeting, an interim report was presented by Dr. Washbourn with regard to his bacteriological examination of the water supplies of the town. In this report Dr. Washbourn said the examination upon which he was engaged required prolonged and careful investigation, and at the present time was not complete. He detailed his researches so far as they had gone, and concluded by stating that the main fact at which he had arrived was that a sample of water taken from the Tutsham Spring contained 560 bacteria per cubic centimetre; and, considering the large number of bacteria belonging to the *Coli* group present, he had no hesitation in saying that the water was polluted with animal alvine excreta. A letter was received from the Secretary of the Water Company (Mr. C. A. Case), asking the Council to appoint a small Committee to meet a Committee of the Directors, in order that the two bodies interested in the water supply of the town might in future hold closer communion; but no action was taken upon it. The total number of cases reported at the close of last week was 1775; and the relief fund amounted to about £16,000.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST

Referred to on p. 942.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 14	10½	Alliance & Dublin 10 p. c.	23½–24½	–½	4 5 9
100,000	10	,,	7½	Do. 7 p. c.	16½–17½	..	4 5 8
300,000	100	July 1	5	Australian 5 p. c. Db.	106–108	..	4 12 8
200,000	10	May 27	7	Belgrano (B. Ayres), Ltd	10¼–10¾	..	6 10 3
100,000	Stk.	June 29	5	do. 5 p. c. Db. Stk.	107–110	..	4 10 11
200,000	5	May 27	6½	Bombay, Ltd.	6⅞–7¼	..	4 9 7
40,000	5	,,	6½	Do. New, £4 paid	5¼–5½	..	4 10 7
380,000	Stk.	Aug. 27	12	Brentford Consolidated	300–305	..	3 18 8
240,000	,,	,,	9	Do. New	227–232	+2	3 17 7
50,000	,,	,,	5	Do. 5 p. c. Prf.	145–150	..	3 6 8
159,375	,,	June 11	4	Do. 4 p. c. Db. Stk.	135–139	..	2 17 6
220,000	Stk.	Sep. 15	11⅓	Brighton & Hove Orig.	273–278	..	4 2 8
208,820	,,	,,	8⅓	Do. A. Ord. Stk.	200–205	..	4 2 11
933,500	Stk.	Aug. 27	5	Bristol, 5 p. c. max.	130–135	..	3 14 1
420,000	20	Sep. 30	11½	British	56–57	..	3 18 11
50,000	10	Aug. 27	11½	Bromley, Ord. 10 p. c.	25–27	..	4 5 2
71,000	10	,,	8½	Do. 7 p. c.	20–22	..	3 17 3
500,000	10	Oct. 14	6	Buenos Ayres (New) Ltd	10–11	..	5 9 1
98,122	Stk.	—	4	Do. 4 p. c. Db. Stk.	98–100	..	4 0 0
150,000	20	July 15	8½	Cagliari, Ltd.	30–32	..	5 3 1
100,000	10	Sep. 30	8	Cape Town & Dis., Ltd.	16½–17½	–½	4 11 5
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	60–61	..	4 18 5
550,000	Stk.	Oct. 14	13½	Commercial Old Stock	340–345	..	3 18 3
196,483	,,	,,	10½	Do. New do.	255–260	..	4 0 9
196,309	,,	June 11	4½	Do. 4½ p. c. Lb. do.	155–158	..	2 16 11
800,000	Stk.	June 11	13	Continental Union, Ltd.	258–263	+1	4 19 0
200,000	,,	,,	10	Do. 7 p. c. Prf.	217–222	..	4 10 2
51,600	Stk	Aug. 27	14	Croydon A 10 p. c.	315–320	..	4 7 6
163,400	,,	,,	11	Do. B 7 p. c.	252–257	..	4 5 7
535,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	137–140	..	3 15 0
60,000	,,	,,	5	Do. 5 p. c. Prf.	140–143	..	3 9 11
486,090	10	July 29	11	European, Ltd.	25½–26½	..	4 3 0
354,060	10	,,	11	Do. £7 10s. paid	18–19	..	4 6 11
5,896,590	Stk.	Aug. 12	12¾	Gaslight & Coke, A, Ord.	309–312	–4	4 1 9
100,000	,,	,,	4	Do. B, 4 p. c. max.	113–118	..	3 7 10
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	317–322	..	3 2 2
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	150–155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	220–225	..	3 6 8
1,900,000	,,	,,	7	Do. H, 7 p. c. max.	203–206	..	3 7 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	317–322	..	3 2 2
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	182–187	..	3 4 2
1,061,150	,,	June 11	4	Do. 4 p. c. Db. Stk.	139–142	..	2 16 4
294,850	,,	,,	4½	Do. 4½ p. c. do.	156–159	..	2 16 7
908,000	,,	,,	6	Do. 6 p. c. do.	207–212	..	2 16 7
70,000	10	Oct. 28	8	Hongkong & China, Ltd.	14–15*	+½	5 6 8
3,800,000	Stk.	May 13	10	Imperial Continental	220–225	..	4 8 11
376,400	100	Aug. 3	4	Do. 4 p. c. Dbs. Red.	99–102	..	3 18 5
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk.	104–107	..	3 5 5
75,000	5	June 29	6	Malta & Medn., Ltd.	5½–6	..	5 0 0
560,000	100	Oct. 1	5	Met. of Melbourne	5 p. c. Db.	110–112	..	4 9 3
250,000	100	,,	4½		4½ p. c. Db.	106–108	..	4 3 4
541,920	20	June 11	5	Monte Video, Ltd.	15–16	..	6 5 0
150,000	5	May 27	8	Oriental, Ltd.	8¼–8½	..	4 11 5
135,000	5	,,	8	Do. New, £4 10s. pd.	7¼–7½	..	4 12 10
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½–2	..	4 0 0
60,000	5	Sep. 30	7	Ottoman, Ltd.	4½–5	..	7 0 0
420,000	100	Nov. 2	6	People's Gas of Chicago	1st M. Bd.	104–109*	..	5 10 1
500,000	100	June 1	6		2nd do.	105–110	..	5 9 1
250,000	10	Sep. 30	10	San Paulo, Ltd.	16½–17½	..	5 14 3
5,475,000	Stk.	Aug. 12	5½	South Metrop., 4 p. c. Ord	144–147	..	3 11 5
1,416,667	,,	July 15	3	Do. 3 p. c. Db. Stk.	106–109	..	2 15 0
60,000	Stk.	Sep. 15	12	Tottenham and Edmonton	A.	280–290	..	4 2 9
60,000	,,	,,	9		B.	205–215	..	4 3 9
182,380	10	May 27	10	Tuscan, Ltd.	13¾–14½	..	6 18 0
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red.	10⅔–10⅝	..	4 15 3
				WATER COMPANIES.			
746,159	Stk.	June 29	10½	Chelsea, Ord.	337–342	..	3 1 5
150,000	,,	,,	5	Do. 5 p. c. Prf.	177–180	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p. c. 1 f. Stk., 1875	157–160	..	2 16 3
175,785	,,	Sep. 30	4½	Do. 4½ p. c. Db. Stk.	160–165	..	2 14 6
1,720,560	Stk.	Oct. 14	7½	East London, Ord.	233–238	+1	3 3 0
654,740	,,	June 29	4½	Do. 4½ p. c. Db. Stk.	163–166	..	2 14 3
390,000	,,	,,	3	Do. 3 p. c. Db. Stk.	106½–107½	..	2 15 10
700,000	50	June 11	7½	G'd Junct'n, 10 p. c. max.	128–128	+1½	2 18 6
295,000	Stk.	Sep. 30	4	Do. 4 p. c. Db. Stk.	147–152	..	2 12 8
708,000	Stk.	Aug. 12	13	Kent	357–362	..	3 11 10
160,000	,,	,,	7	Do. New, 7 p. c. max.	215–220	..	3 3 7
1,043,800	100	June 29	10†	Lambeth, 10 p. c. max.	303–308	+8	3 4 10
406,200	100	,,	7½	Do. 7½ p. c. max.	225–230	+2	3 5 2
350,000	Stk.	Sep. 30	4	Do. 4 p. c. Db. Stk.	147–150	..	2 13 4
500,000	100	Aug. 12	13	New River, New Shares	450–455	..	2 17 1
1,000,000	Stk.	July 29	4	Do. 4 p. c. Db. Stk.	152–155	..	2 11 7
902,300	Stk.	June 29	5	Southw'k & V'xhall, Ord.	163–166	+1	3 0 2
126,500	100	,,	5	Do. do. 7½ p. c. max.	151–154	..	3 4 11
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf.	173–178	..	2 16 2
1,019,585	,,	Oct. 14	4	Do. 4 p. c. A Db. Stk.	144–147	..	2 14 7
1,155,066	Stk.	June 11	10	West Middlesex	320–325	+3	3 1 6
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	163–166 *Ex div.	..	2 14 3

† Next dividend will be at this rate.

THE FIGHT FOR THE TODMORDEN WATER-WORKS.

Feeling runs high in both the Rochdale and Todmorden districts over the proposal of the Corporation of the former town to acquire the water-works supplying the latter; and it is being much debated in the local Press and at municipal election meetings. At the meeting of the Rochdale Corporation last Thursday, the Water Committee recommended that a Bill should be promoted in Parliament to give them power to acquire the Todmorden Company's reservoir and gathering-ground; and a prolonged debate ensued. The Chairman of the Committee (Alderman W. T. Heap) was confronted by numerous questions on the subject; and from his answers it appeared that, if the Corporation purchased the Company's works, the liability would amount to above £800 a year. The Committee had now to supply 16,000 more consumers than in 1887. At the present time the reservoirs were practically full; and they had 140 days' supply of water. They had no intention, if they acquired the works, of raising the price of water to the inhabitants of Todmorden; nor would Parliament grant such power. Mr. Howarth moved an amendment, that the minutes of the Committee be confirmed, with the exception of the part relating to the purchase of the works. He thought they could get a cheaper supply of water than by acquiring the Company's property, which up to the present time had never paid the shareholders any dividend. As an alternative means of increasing the supply, he suggested the raising of the embankment of the Spring Mill reservoir 2 feet, which would, he believed, not cost much. Mr. Ford seconded the amendment, and reminded the Council that, if they purchased the Todmorden works, it would mean an increase of the rates by 2d. in the pound for a few years. Alderman Heap warned the Council that, if they did not purchase the Todmorden works, they could not get new gathering-grounds nearer than 18 miles; and they would be liable to be opposed by some of the inhabitants of Yorkshire. On the amendment being submitted, 36 members voted against it; and the original resolution was therefore carried.

The Todmorden Town Council on the previous day resolved, by a majority of 21 to 2, to oppose the proposed purchase by the Rochdale Corporation, and to promote a rival Bill to give Todmorden the power to buy out the Company. The Mayor assured the Council that the burden would not in any case be a heavy one.

New Joint-Stock Companies.—The Prism Globe Syndicate, Limited, has been formed to adopt an agreement, and to carry on the business of glass manufacturers and blowers, prism globe makers, electrical and mechanical engineers, electricians, suppliers of electricity, &c. The capital is £25,000, in £1 shares. The Sardis Patent Gas Generator Syndicate, Limited, with a capital of £5000, in £1 shares, will adopt an agreement made with E. F. Schieroni, and acquire and work certain undescribed patents. The Incandescent Mantle Corporation, Limited, with a capital of £1000, in £1 shares, will acquire patents for incandescent or other gas lighting, and manufacture, import, and sell requisites for same.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Bailie Kinloch Anderson reported to the Edinburgh and Leith Gas Commissioners on Monday, that there had been an increased output of gas during September, over the same month of last year, of 6¼ million cubic feet; and that the increase since May 16 had been 22 million cubic feet. There was, he said, one pleasing feature about this increase, in that it was largely due to the extra consumption for cooking and heating. They had this year fixed 497 more cookers than last. This being the last public meeting which the Commissioners will hold till after the elections, and as Lord Provost Sir Andrew M'Donald goes out of office, Bailie Kinloch Anderson took advantage of the opportunity to move a vote of thanks to his Lordship for his services during the time he has been Chairman of the Commission. He gave the Lord Provost high praise as a business man; and I may say that nearly everybody will acquiesce in what was said. The speaker threw out the suggestion that Sir Andrew might be sent back to the Commission by the Town Council of Edinburgh, who are not obliged to select their representatives on the Gas Commission from their own number, and who, as a matter of fact, nearly always have one or two past town councillors on the Commission. The Lord Provost expressed his willingness to return to the Gas Commission, but only on condition that he did not displace someone else.

Professor Sir Henry Littlejohn has fired a bomb into the midst of the Edinburgh and Leith Gas Commissioners. In his capacity of Medical Officer of Health for the City of Edinburgh, he has seen fit to consider and report on the subject of the supply of carburetted water gas. This report (p. 958) is couched in a different vein from what is usual with scientific gentlemen. The reason is obvious. Sir Henry Littlejohn was not reporting on a remit by persons whose leanings were in the direction of the new gas; his interest was the protection of the public health. He therefore states the hard, bare, and somewhat unpalatable truths, that the gas is really dangerously poisonous; that the giving of a pungent odour to it would have no effect when persons are asleep, which is the time most cases of gas poisoning occur; and that it is still an open question whether the gas does not layer. He has come to my rescue in the last remark. I have both read, and heard it stated, that carburetted water gas, if properly mixed at the inlet to the holder, can never separate itself, or be separated, from coal gas; but all the statements I have encountered were theoretical. Has anybody ever tested the matter? The process would be quite simple. In the summer a gasholder could easily be kept filled for a month; and periodic tests of gas drawn at different zones could be made. Not till then will the question be settled. But who, of all the people who use carburetted water gas, has an interest in doing anything which might depreciate a favourite process? There is another test which ought to be applied. If there be any dead-ends, where the consumption is small, gas might stand for several weeks before being consumed; and in this time

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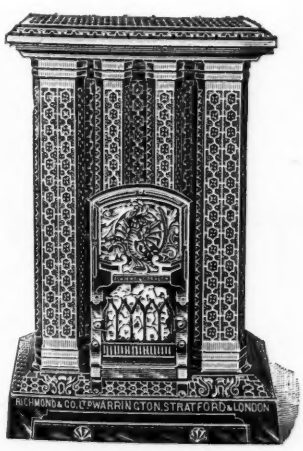

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it might undergo a change, by condensation or otherwise. Such changes take place in coal gas; but it is not to the interest of the producer to publish them, and they are little heard of. Might not changes take place in carburetted water gas, which it is desirable should be known? Sir Henry Littlejohn's report has led to a correspondence in the "Scotsman" on the subject; but out of this little has come. The matter is not, however, at an end yet. This report must come before the Town Council, where it is certain to give rise to remark. It may be too late, now that the plant has been erected, to agitate upon the subject; but if alarm is to be created in the community, there will be no harm in the Town Council asking the Gas Commissioners their reason for preferring carburetted water gas when they had the offer of a process of enrichment which is more economical, and is absolutely free from objection in the matter of carbonic oxide.

The Cambuslang Gas Company, a small undertaking with an output of about 20 million cubic feet of gas yearly, and supplying a population of scarcely 10,000, have introduced an installation of electric light into their town. The district is a residential one, in the eastern suburbs of Glasgow. At the opening ceremony, on Wednesday night, it was claimed that this was the first instance in the United Kingdom of a Gas Company having introduced electric lighting. I am not in a position to say whether this is correct; but certainly I know no other Gas Company in Scotland who sell electricity. The Cambuslang Gas Company, I daresay, have not gone into the supply of electricity of their own accord; for it naturally is not their business. The Chairman of the District Committee of the County Council some time ago prepared a scheme of electric lighting, for which power was to be derived from the River Clyde. The river at that place, however, is rather sluggish; and consequently it would not have furnished very satisfactory driving power. The scheme was accordingly abandoned. Afterwards the Gas Company came forward with their plan; and there being no body interested in opposing them, it has been carried into effect. They derive power from one of Crossley's "Otto" gas-engines. Thus, if the Company lose somewhat in the consumption of gas for lighting, they will always have an account for gas for the driving of the engine. It remains to be seen whether the venture will prove successful. I suppose the expectation is not so much that money will be made by the sale of electricity, but that, by themselves taking the work in hand, they retain the position of light suppliers for the district. It is an unusual step; but, as we know, "nothing venture nothing win." The Company's enterprise deserves recognition upon this ground, even though they may not find the scheme to be a profitable one. The ceremony of turning on the light was attended by a company who assembled at the gas-works on the invitation of the Directors. It was the intention of the promoters that the light should be turned on by Mr. Graham, the Chairman of the District Committee; but he did not arrive, and it was performed by Mr. Lindsay Miller, the Chairman of the Company. His position was rather a unique one. A few years ago, it was scarcely to be anticipated that the Chairman of a Gas Company should turn on an electric light supply. That it took place this week in Cambuslang, is but one of many proofs that the two lights are rapidly coming nearer to each other. They have been regarded as rivals; but, truth to tell, this feeling has always been much more rampant outside the ranks of gas manufacturers than inside. The general public have been wont to look upon the two industries as enemies—so much so that it has been a stock subject of comment during the past twenty years or so. The electricians themselves have frequently indulged in a "gird" at the old light. Those in the gas line deserve credit for the quiet way in which they have accepted all the criticism and comment of outsiders. Without neglecting to put their house in order—for that would have been folly—they have played a waiting game. It is said that "everything comes to him who waits;" and the truth of this adage seems about to be realized by the electric light coming over to the gas. This need cause no surprise, for no body better qualified to regulate the supply of electricity for lighting purposes could, in the nature of things, be found than those who have made gas supply a success. Who knows but that after the scientists and the æsthetes have struggled for nearly a quarter of a century, with small success, to introduce electric lighting, it may be taken up by gas manufacturers and made a prosperous industry. Any steps in this direction will be interesting; and this one at Cambuslang is specially so on account of its leading position. The installation at Cambuslang is not a large one as yet; the dynamo being only capable of giving out 1110 volts. It is, however, a beginning; and a start having been made, there may be growth to quite large proportions.

There is no gas undertaking in Scotland that I look upon with more interest than that of the Corporation of Hamilton. This is not so much on account of the fact that the management of Mr. W. Ewing has been a phenomenal success, as that, in face of all that he has been able to accomplish, there are members of the Corporation who shut their eyes to what has been done, and make themselves believe that the undertaking is being conducted on wrong lines. One of these is Treasurer Keith. Though there is no occasion for his doing so—there being no gas scheme on hand at present—he has made the subject of the management of the gas undertaking the leading one in the municipal election. The position will be better understood if I give extracts from a couple of speeches which were delivered on Monday evening, at a meeting of electors. Bailie M'Hale, who is Convener of the Gas Committee, and who is seeking re-election, spoke first, according to usage. He said that the only point requiring notice was that the expenditure had been too extravagant. He held that the cost had not been extravagant, and that it would be more than justified in the future. He would ask them to remember that in 1891 the gas made at their works amounted to 55 million cubic feet, while in 1896-7 it was 105 million feet; and he added that he would not be at all surprised if during the current year the consumption was 120 million feet. They could not expect to go on at the same rate of progress; but he thought the provision they had made should be ample to last the town for a good many years to come. Referring to criticisms, as regards the past, he remarked that if they had kept the price of gas at 2s. 11d. or 2s. 6d. per 1000 feet, they would have been able to point to a large surplus. Their works were capable of producing 250 million cubic feet. They had gone on the sound principle of selling gas at the lowest price that was safe. One of the greatest evils they had to struggle against was leakage, which at times amounted to 36 per cent., or one-third of their production. Well,

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they thought that they might to a certain extent lessen this by encouraging the use of gas during the daytime; and in order to do that, they had afforded every inducement for parties to go in for stoves, with the result that they had reduced the leakage during the summer-time from 36 to 15 per cent. Accordingly, if they had lost by charging less for gas-stoves, they had gained enormously in another way. If they had only carried a balance of £180 to profit and loss, they had added a handsome sum to depreciation, and had paid £1000 out of revenue which they might have charged to capital. Then, it was only within the last few months that they had had the benefit of the extension of the works. As to complaints of bad gas, he invited anyone who thought so to employ a gas expert, to whom the Gas Committee would give the use of their photometer, to see if the gas was not all they said it was. As to the application for powers to introduce the electric light, they might be blamed for the step after spending so much on the gas-works. But a private company had made a similar application; and it would never do to have outsiders coming in and taking possession of their streets, with the prospect of having eventually to buy them out at a heavy ransom. The electric light would be the light of the future, and it would not be injurious to the gas-works; for in spite of it the demand for gas went on increasing. Then Treasurer Keith gave his view of the situation. He said that during the past year he had occasion to disagree with Bailie M'Hale on the question of the financing of the gas-works. He held the opinion that the gas-works were not the property of the consumers, but of the community. The works, therefore, being the property of the community, would have to be treated as a commercial concern, and bring in some profit to the proprietors. They had proceeded in past years upon the assumption that the gas was to be sold at cost price. Twice during the past seven years they had placed nothing to depreciation. This, to his mind, was not good financing. The structural cost of the works was somewhere about £50,000; and this should represent an annual profit, at 5 per cent., of £2500. He did not think they should consider that the works were a flourishing concern unless they returned 5 per cent. at least on the capital originally laid out. There was a very large proportion of the poorer classes of the community who did not consume gas. But these parties paid rates; and it was quite a legitimate and fair thing, in respect that the gas-works were the property of the community, that the profits should be applied—evenly distributed, of course, according to rental—to their rates. That was what they were doing with the Common Good; and by their Burgh Act the gas-works were declared to be part of the Common Good. Gas profits, he argued, might be used for some purpose of general utility. When he mentioned that the largest consumer of gas was the barracks, and they paid nothing in the shape of taxes, and the next to them were those who used it for commercial purposes, he thought they would agree that it was not quite reasonable that these people should get their gas at cost price. Now Treasurer Keith surely must see how short-sighted his reasoning is. The gas-works certainly belong to the community—that is to say that if they were sold, the price would go into the burgh funds, and those who do not use gas would benefit as well as those who do. But he must be aware that profit may be made for the community without that profit going through the hands of the Burgh Treasurer. On the principle that "a penny saved is a penny gained," the £2500 which Treasurer Keith, as Treasurer, looks so hungrily for, is earned at present. Every penny of a reduction in the price of gas means the leaving of money in the pockets of the consumers; and if it be said that the non-consumers do not reap any part of this benefit, there are two replies to the remark. The first is that they do indirectly reap benefit, because, for instance, a tailor when the price of gas is low would be able not only to give better value to his customers, but also to pay higher wages to his workpeople, than he would if gas were dear; and the second is that the raising of the price of gas would have the effect of increasing the list of non-users, and thereby diminishing the profits. The doctrine of selling at the lowest rate applies most manifestly to the case of the selling of gas by a Corporation. But on the merits, I may point out that Treasurer Keith is unnecessarily alarmed if he thinks the capital account is too high. From the latest Parliamentary Returns, I find that the money expended upon authorized gas-works in the United Kingdom works out at 12s. 1¾d. per 1000 cubic feet of gas made. In Hamilton the proportion, upon the total capital, is 10s. 2½d. per 1000 cubic feet; but the Corporation have repaid £14,000, and the capital remaining on the undertaking works out at 7s. 7d. per 1000 cubic feet. How much lower would Treasurer Keith wish to have it? It is a wise thing to reduce capital, but not to cripple the business by so doing.

The Campbeltown Town Council met on Wednesday, and considered the annual report by the Gas Committee, which was given in by Mr. Brown. The undertaking, Mr. Brown said, was in a very flourishing condition. The Council resolved to reduce the price of gas from 4s. 7d. to 4s. 5d. per 1000 cubic feet. During the past year, fifteen new retorts have been added to the plant; and there is an expectation of a further reduction in the price of gas being possible.

The Works Committee of the Edinburgh and District Water Trust are preparing a Bill for the next session of Parliament, in which they propose to take powers to lay a new main-pipe from the Moorfoot to the Alnwickhill reservoir, by which means from 3 to 4 million gallons of water more per day may be brought to the city. It is also proposed to raise the level of the Gladhouse reservoir by 1 foot, adding to its capacity by 100 million cubic feet. The area of supply is to be extended by the inclusion of the parishes of Lasswade, Cockpen, and Newton, through which the main-pipes pass. In the Bill power will also be taken to raise £200,000 for purposes of the measure. The Committee accepted the tender of Messrs. Robert Macfarlane and Co., of Glasgow, for the supply of cast-iron pipes for the new main. The price is £11,300, which is at the rate of 94s. per ton, and is 2s. per ton less than the tender of the American firm. It is intimated that Sheriff Crawford, of Aberdeen, who is Oversman in the arbitration to fix the compensation payable by the Trust for injury to salmon fishing in the River Tweed by abstraction of water under the Talla augmentation scheme, has issued his award. The Tweed Commissioners claimed £10,000. The Oversman awarded £2250, of which £500 is applicable to the fishing grounds on and above the reservoir, and the balance to the fishings below. In respect that the Water Trust contended that the arbitration was only to fix the

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compensation for injury during the time of the construction of the works, the Oversman has given an alternative award of £550.

The Police Commissioners of Kelso have been for a number of years on the look-out for an augmentation to the town water supply. During the past year or two they have been frequently reminded by the Local Government Board that a more satisfactory service than that which now exists must be found. A scheme has been prepared and reported on by Messrs. J. & A. Leslie and Reid, of Edinburgh, to bring a gravitation supply from the Heatherhope Burn, supplemented by a further supply from the Crilshope Burn, from a point 15 miles from the town. The estimated cost is £17,000. This sum, however, it is calculated, would entail a rate of about 2s. 7d. in the pound for thirty years; and the feeling in the community is opposed to the scheme.

In Selkirk, there is also a scheme to augment the town water supply, according to a scheme prepared by Messrs. Leslie and Reid. It is proposed to take the water from the Lewinshope and Scaddow Burns, on the Yarrow, about eight miles above Selkirk. The estimated cost is about £11,500. It is understood that the scheme is likely to go on. It is proposed to borrow the money for the work at 5 per cent., repayable in forty years, which would entail a rate of 7d. in the pound in addition to the present rate of 5d.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 30.

Sulphate of Ammonia.—There has been an active market, and good business has been done for prompt delivery. Buyers having sales for October delivery to cover, being no longer able to postpone their purchasing, came forward at the higher figure asked at the close of last week; and, ready supplies not being over plentiful, a further advance was paid before all the month's requirements were filled. There has also been a fair amount of direct export business; but buyers abroad have hesitated to pay the latter prices, believing them to be occasioned by speculative exigencies. The closing quotations are £8 5s. to £8 7s. 6d. per ton, delivered f.o.b. at the ports. The greatest activity has been experienced in Scotland, where up to £8 7s. 6d. per ton has been paid, delivered f.o.b. Glasgow and Leith. The strength of the position appears to be asserting itself, chiefly in the greater confidence with which buyers regard the future. London stuff has been sold up to £8 7s. 6d. per ton, Beckton terms, November to April delivery; and £8 10s. per ton is now required. In Scotland, for January-June delivery, £8 12s. 6d. per ton has been paid, f.o.b. Leith; and makers are now practically off the market.

Nitrate of Soda is steady on spot, at 7s. 4½d. per cwt. for good up to 7s. 6d. per cwt. for fine quality.

LONDON, *Oct.* 30.

Tar Products.—Pitch is steadier; and the position for the ensuing season is a little more assured. But, whether it will advance, as has been hoped for by makers, it is doubtful to forecast, since fuel makers declare that they are well supplied. The demand for fuel, as well as coal, is extremely good; and this may tend to help pitch before long. Benzol occupies an anomalous position; for while buyers only offer 1s. 9d. for 90's., and 1s. 11d. for 50's., published quotations are 1s. 11d. and 2s. respectively. At the close of the week, there is much more inquiry for benzol, particularly of the 50 per cent. grade. Toluol is scarce, and is much sought after; as high as 2s. 3d. having been paid for this year's delivery. Curiously, the Continental buyers are quite out of the market, and have made no purchases of benzol in this country recently. Creosote is decidedly firm; and stocks in makers' hands are not giving any trouble. There is no change in anthracene; the market having been practically cleared of cheap parcels. There is very little offering, while the Tar Products Sales Committee maintain a strong attitude in respect to the article. That distillers are hoping for better prices is seen from the fact that some tar contracts have recently been made beyond its value at to-day's selling price of products.

Average values during the week are as follows: Tar, 17s. to 21s.; Pitch, 17s. to 20s. Benzol, 90's, 1s. 9½d.; 50's, 1s. 11d. Toluol, 2s. 3d. Solvent naphtha, 1s. 8d. Crude, 30 per cent., naphtha, 11d. Creosote, 1¾d.; liquid, 2½d. Heavy oils, 40s. Carbolic acid, 60's, 2s. Naphthalene, pressed, 52s. 6d.; salts, 27s. Anthracene, "A," 5½d.; "B," 4d. to 4½d.

Sulphate of Ammonia continues in better request; and higher prices are being obtained at all ports—to-day's quotations being: London, £8 7s. 6d.; Liverpool, £8 6s. 3d.; Hull, £8 5s.; Leith, £8 7s. 6d.—all less 3½ per cent.; while for forward delivery 5s. per ton more is asked.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The month opens without any further change in prices; the exceptional weather which has been experienced during October effectually putting a check upon any further contemplated upward move in the better qualities of round coal. The continuance of the dispute in the engineering trade, and the threatening outlook with regard to the wages question in the cotton industry, have also a depressing effect upon the lower qualities of fuel. Pits are still kept generally on full time, with very little stock of any moment accumulating; and but for the present exceptional conditions, there is no doubt a very satisfactory trade would be forthcoming. The best qualities of Wigan Arley average 10s. to 10s. 6d. per ton at the pit; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; lower class round coals, about 7s. to 7s. 6d. Steam and forge coals are fairly steady at late rates, and are still quoted 6s. to 6s. 6d. per ton for inland sales. Engine classes of fuel, except that here and there surplus lots are pushed at low figures for prompt sale, continue generally firm; and on forward contracts especially colliery proprietors are not disposed to entertain anything under present full rates. Prices average 3s. 3d. to 3s. 6d. per ton at the pit for common slack, 3s. 9d. to 4s. 3d. for medium sorts, and 4s. 6d. and 4s. 9d. to 5s. for best qualities. Steam coal averages 8s. 3d. to 8s. 6d. per ton.

Northern Coal Trade.—There is now a decreased demand for steam

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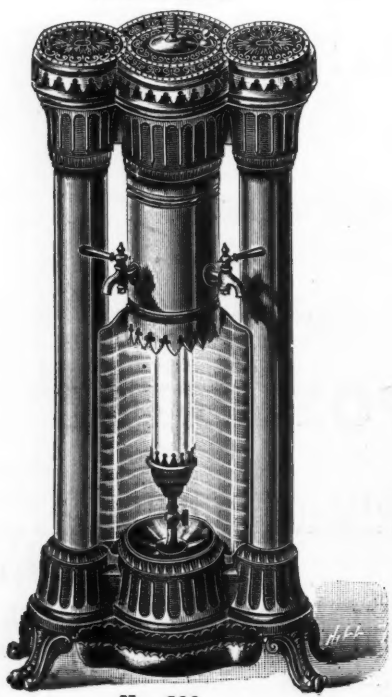

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coals, and an increased business in gas and household coals; so that the Durham collieries are well occupied, and the tonnage of gas coals shipped is very large. Best Northumbrian steam coals vary from 8s. 3d. to 8s. 4½d. per ton f.o.b.; second-class steams being from 7s. 9d. to 8s.; and steam smalls, 3s. 3d. to 3s. 6d. Manufacturing coals are very dull, in consequence of the strike. In the gas coal trade, there is an increased demand, and the shipments are now nearly at the largest point; while the fine weather allows them to be so well kept up that the stocks are increasing satisfactorily at many works. Prices quoted for best Durham gas coals vary from 7s. 6d. to 8s. per ton f.o.b. Contracts are being negotiated for next year's supply at prices that are from 6d. to 1s. per ton above those that ruled for the current year. Gas coke is unaltered in price this week.

Scotch Coal Trade.—Trade for all sorts of coal remains very active; and there is every prospect of a continuance of the existing state of matters for some time. There is little variation on the prices, which are quoted as follows: Main, 7s. per ton, f.o.b. Glasgow; ell, 7s. 3d. to 7s. 9d.; and splint, 7s. 6d. to 7s. 9d. The shipments for the week amounted to 182,732 tons—an increase of 17,822 tons over the preceding week, and of 10,898 tons over the corresponding week of last year. For the year to date, the total shipments have been 6,592,311 tons—an increase of no less than 283,535 tons over the corresponding period of 1896.

The Disappearance of the Secretary of the Cambridge Gas and Water Companies.—The first meeting of the creditors of Mr. William Peed, of Cambridge, who disappeared on Sept. 27, as already recorded, was held at the Lion Hotel in that city last Wednesday. The Official Receiver (Mr. Savill) said the liabilities would, roughly speaking, exceed £140,000, in addition to £56,725 secured creditors. The assets were estimated at about £9000. So that, allowing for the cost of the bankruptcy, the dividend was not likely to be more than 1s. or 1s. 3d. in the pound. He then read through the proofs of the debts lodged for the purposes of the meeting, which amounted to £92,827. The other proofs were for amounts of less than £1000. Mr. Tansley Witt was elected as the trustee.

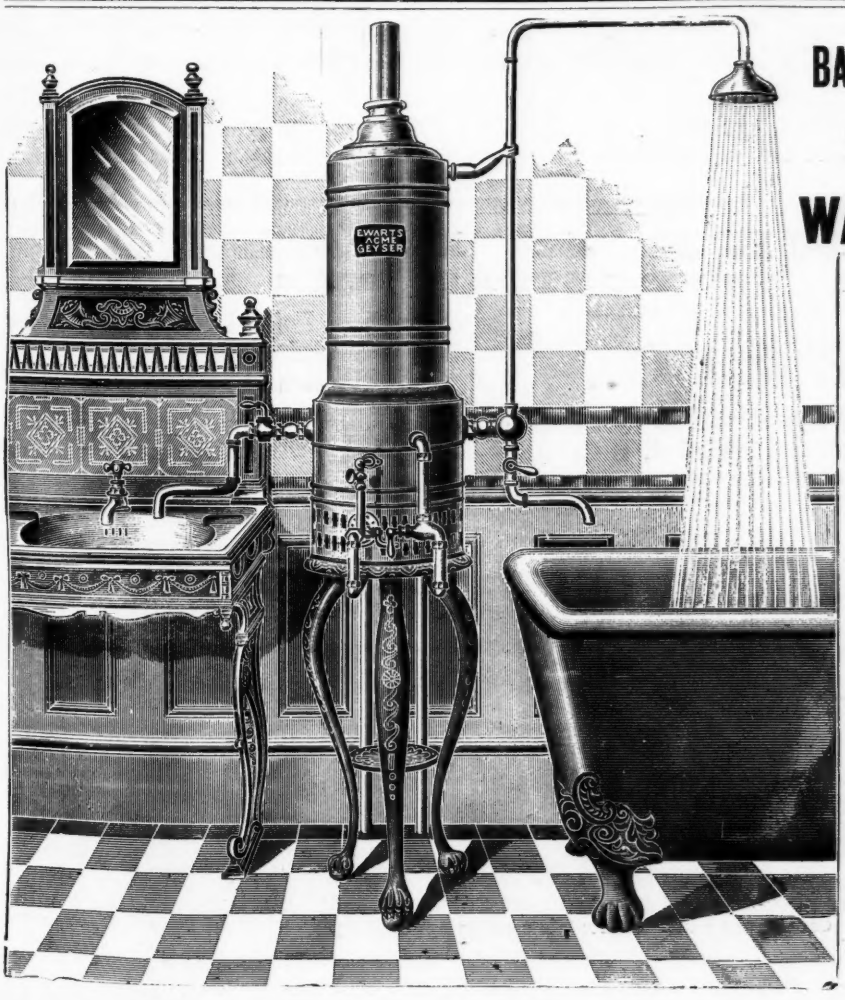
Gas Explosion in Southwark.—An alarming explosion of gas occurred at about eight o'clock on Monday night last week in a suite of apartments in Queen's Buildings, Southwark Bridge Road. Gas-fitters had been at work during the day, putting up pendants in one of the rooms; and soon after they left, the room was entered by several persons, one of whom carried a lighted candle. Immediately a loud explosion occurred, followed by cries from the injured. As soon as the smoke and dust cleared away, it was found that John Ernest Baker, aged 17, and Jessie Herman, aged 26, had been severely burned on the face, hands, and body. A woman named Emma King, 76 years old, was also badly burned on her arms. The other persons who entered the room at the same time were fortunate enough to escape with less serious injuries, but they all suffered to some extent. Medical assistance was procured, and the injured persons were promptly attended to.

Lambeth Water Company.—The Directors have decided, subject to audit, to transfer £3000 to the contingency fund, and to recommend the payment of dividends for the past half year at the maximum rates of 10 and 7½ per cent. per annum respectively on the share capital of the Company, leaving a balance of about £4730 to be carried forward, after making provision for the statutory payment to the sinking fund.

Suffocation by Gas in a Bath-Room.—An inquest was held at Oxford on Monday last week on the body of Mr. Samuel E. Mowbray, a printer and ecclesiastical publisher of the city. Having recently been unwell, he remained in bed on the previous Saturday morning; but later he was found dead on the bath-room floor. The room was full of gas. It was ascertained that, by opening the door of the stove, the gas was turned on; and it was suggested that the deceased went to light the gas in order to heat the water, and was overcome. A verdict of "Accidentally suffocated" was returned.

The Strike of Gas Stokers at the Heywood Corporation Gas-Works.—Referring to the strike of gas stokers at the gas-works towards the end of the previous week, Mr. Maden informed the members of the Town Council last Thursday that the town had had a narrow escape of being without gas. The dispute arose through one of the men quarrelling with the night foreman. The workman's attitude and manner were such that the Manager (Mr. W. Whatmough) could not pass them over, and he told him he would have to leave. The other men then refused to work, and consequently the Manager found himself in a tight place. A few extra men were obtained; and Mr. Whatmough managed to tide over the difficulty. On the Saturday the dispute was settled upon the workman in question expressing regret for his conduct. However, the effects of the strike were still being felt; and they would be for a few days.

New Incandescent (Sunlight Patent) Gas-Light Company, Limited.—The second ordinary general meeting of this Company was held last Tuesday, at Winchester House, E.C.—Mr. J. H. Duncan presiding. In moving the adoption of the report, he said that, though the Directors were not in a position to pay a dividend, he thought they could point to circumstances in connection with their business which indicated that they would before very long be able to distribute something among the shareholders. They had had to fight powerful opponents; but in one particular they had scored considerably—viz., by inducing the Court to compel their rivals to insert in their advertisements words to the effect that the Sunlight mantles were not an infringement of the Welsbach patent. Referring to the profit and loss account, he said that a sum of £8250 had been received from the vendor Company in recoupment of special expenditure to which they had been put in bringing the Sunlight mantle to its present commercial value, for loss of business, and so on. The gross profit stood at £786. In the course of the discussion which ensued, several shareholders criticized the accounts at some length, and complained of the heavy expenses. An amendment was moved that the accounts should not be accepted; but, after some discussion, it was withdrawn, and the motion agreed to. Subsequently a Committee of shareholders was appointed to select new Directors to fill the vacancies on the Board, and other matters.



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Newark's Opposition to the Nottingham Corporation Water Scheme.—The members of the Newark District Council had before them yesterday week a detailed account of the expenses incurred in opposing the Nottingham Corporation water scheme last session; the total being rather more than £5000.

Additional Water-Works for Bilston.—The Bilston District Council last Wednesday decided to apply for loans amounting to £8650, for water-works purposes. About £2000 is to be spent on a new boiler and house at the Bratch water-works, £1000 on a new main to Bradley, and £4000 on an additional reservoir. The remainder is required for a house and offices and telephonic service.

Sales of Shares.—At the Taunton Gas Company's works yesterday week, £5000 of new ordinary stock was sold by auction. This is part of the £40,000 authorized to be raised by the Company's Act of last session; and it is entitled to a standard dividend of 7 per cent. The prices realized ranged from £151 to £158 for £100 lots; from £78 to £80 for £50 lots; and from £32 to £33 for £20 lots. Last Thursday, Mr. G. Turner held a sale of gas shares at Ipswich, and disposed of £1770 "A," "B," and "C" stock and a £300 3 per cent. mortgage bond of the Ipswich Gas Company. The "A" stock fetched £30 5s. and £30 12s. 6d. per share; the "B" stock, £24 12s. 6d. per share; and the "C" stock at an average of £23 2s. 6d. per share. The mortgage bond, with the accruing dividend from Oct. 1, realized £302 10s. At the same auction, ten £10 shares in the 1859 capital of the Bury St. Edmunds Gas Company, with the accruing interest from Oct. 1, were sold for £20 10s. each; while 26 similar shares realized £20 12s. 6d. per share. Some £5 shares in the West Ham Gas Company have lately been sold at from £12 to £12 2s. 6d. each. A parcel of original (£1) shares in the New Swindon Gas Company were sold a short time ago at from £2 7s. 6d. to £2 13s. each. At the offices of the Fleetwood Gas Company last Tuesday, Mr. R. Westby offered for sale £6000 of "B" ordinary stock of the Company. It ranks for a standing dividend of 7 per cent., subject to the sliding-scale; the last dividend having been at this rate. The bidding was brisk, and the prices varied; but the average was £15 per £10 share.

The Fatal Accident at the Warrington Gas-Works.—The inquiry into the circumstances attending the fatal accident to two men, named Meredith and Brayshaw, at the Warrington Gas-Works, on the 12th ult. (*ante*, p. 859), was resumed by Mr. S. Brighouse last Tuesday. Norman Dawes, who had given evidence on the previous occasion, was recalled, and examined by Mr. Sykes, representing the relatives of the deceased. He said he thought the accident was due to a block giving way, and the chain from it slackening, and causing the purifier-lid to drop. The chain had been tested by being employed on similar work before. The foreman (Mr. Crossley) twice gave witness and the two deceased warning. The first time was when they were outside the purifier, and the second time when they were inside. They disregarded the warnings, because they thought the position was safe. After the accident, witness saw that the wheel overhead had skidded, and that the chain was at an angle. Mr. W. S. Haddock, the Gas Engineer to the Corporation, said the lifting arrangement was originally supplied by Messrs. Adam Woodward and Co., of Manchester, in 1880, and extended by Messrs. Newton, Chambers, and Co., in 1895. The carriage had slipped when the latter were carrying out some alterations; and he was informed by his foreman since the accident that it had slipped once subsequently. Mr. Crossley having given evidence, the jury returned a verdict that the deceased had met their deaths accidentally, by the sudden falling of an iron covering which was being lowered by chains attached to the sides, to fit in the tank of a gas purifier, the falling of the same being caused by the splitting of the carriages. They expressed the opinion that the accident was the result of the bolts, which were dog bolts, being of insufficient strength; and they suggested that in future the bolts used for such purpose should be bolted through the carriages and the iron.

Increased Storage at the Dawsholm Gas-Works.—The order for the new gasholder which is to be erected at the Dawsholm Gas-Works of the Glasgow Corporation has been placed with the Barrowfield Iron-Works, Limited, of Glasgow. It is to be a three-lift one, 216 feet in diameter, each lift being 48 feet deep. It will have steel lattice guide-framing and girders. The contract sum is £31,656. It is to stand alongside the three-lift holder, 240 feet in diameter by 45 feet deep each lift, erected by the same firm in 1892-3.

Water-Works Improvements at Gainsborough.—The Gainsborough District Council have instructed their Engineer to enlarge No. 1 bore-hole whence the main water supply for the town is drawn, and to put in a permanent pumping plant to obviate the necessity of reverting to the alternative supply from the River Trent in the summer. Another deep bore-hole is in progress; but the work is delayed in consequence of the boring tool having been broken 750 feet below the surface. By the work suggested, the water supply will be increased 42 per cent., at a cost of about £1500; and it will then be sufficient for the town.

Increased Storage at the Malvern Gas-Works.—The increase in the consumption of gas which has taken place at Malvern in the past decade has necessitated from time to time the extension of the manufacturing and storing plant at the gas-works, which are owned by the District Council, and are under the supervision of Mr. H. P. Maybury. The latest addition is a two-lift holder on the wire-rope system of Messrs. Ashmore, Benson, Pease, and Co., Limited. The inner lift is 117 feet, and the outer one 120 feet in diameter—both being 24 feet deep; and the holder will contain 533,000 cubic feet of gas. The breaking strain on each of the ropes is upwards of 15 tons; and the Contractors have undertaken to keep the ropes and fittings in working order for five years. The tank—a brick one—has been constructed by the Council directly under the superintendence of the Gas Engineer. In making it 390,000 bricks, 3000 yards of puddle, 300 tons of concrete, and 60 tons of dressed stone were employed; and it contains 2¼ million gallons of water. The gas inlet and outlet pipes are 24 inches in diameter.

The Glenboig Union Fire-Clay Company, Limited, and Tangyes, Limited, have received diplomas of honour at the Brussels Exhibition.

The Directors of the Monte Video Gas Company, Limited, have declared an interim dividend of 2½ per cent. for the half year ended June 30 last.

An important sale of £50,000 of new stock of the Sunderland and South Shields Water Company will be held by Mr. A. Gibson, at the Queen's Hotel, Sunderland, on the 10th inst.

The sale to be conducted by Mr. Alfred Richards on the 16th inst., includes shares in the Aldershot and Winchester Gas and Water Companies, and stock of the Caterham and Chigwell Gas Companies.

The Bristol Gas Company are about to issue £20,000 of general capital stock and £5000 of new debenture stock in £100 lots; and it will be offered for sale by Messrs. Nichols, Smith, and Alder, at Bristol, on the 18th inst.

Messrs. Clayton, Son, and Co., Limited, have been entrusted with the contract for the erection of a gasholder at the Ramsgate Gas-Works, under the supervision of the Gas and Water Engineer (Mr. W. A. Valon). The tender submitted by the firm was a very close one indeed to the Engineer's estimate.

We have received a copy of the new catalogue of Frédureau's patent light-diffusing globes, showing their application to incandescent gas lighting. The globes are in use in a number of theatres, cafés, banks, and offices; as well as for public lighting. Those made for the present season are of English manufacture, and embody several new features; among them being a reduction of weight, practical invisibility of mould sections, and uniformity of prisms.

GWYNNE & BEALE'S

PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 65,095, Holborn.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS;

BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

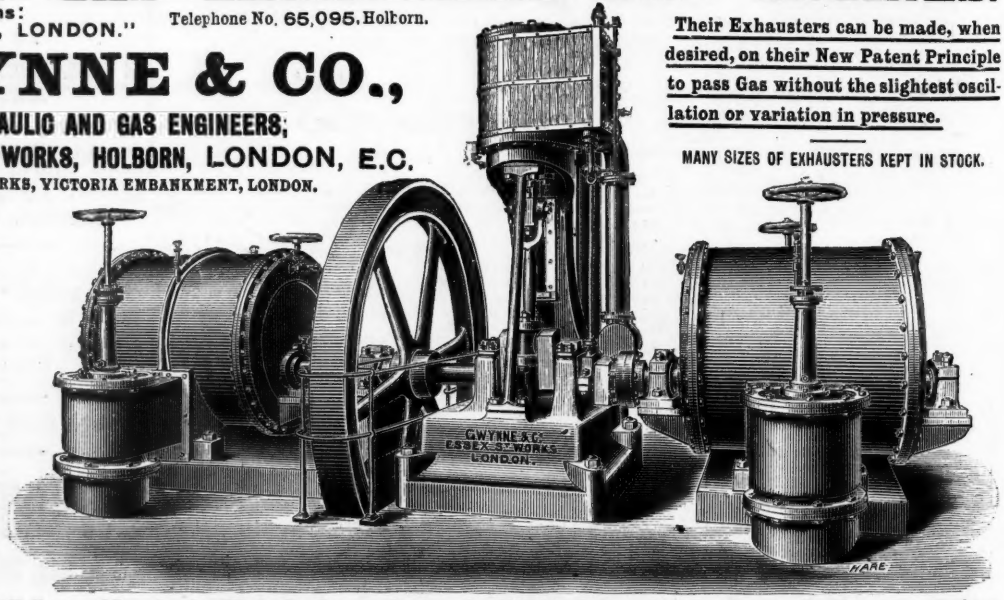
They have completed Exhausters to the extent of 36,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.



Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
JOHN WM. O'NEILL, Managing Director, Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to be addressed to Palmerston Buildings.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 300 British Gas-Works.
ANDREW STEPHENSON,
182, GRESHAM HOUSE,
OLD BROAD STREET,
LONDON, E.C.
Telegrams: "Volcanism, London."

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

TUBES for Gas, Steam, and Water (all Sizes) Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 878, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

CITY Office and Address offered to Manufacturers, &c., by Gentleman with first-class Business Relations with Managers of Gas Undertakings.
Address No. 2942, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Gas-Fitter. Experienced in Service Laying, Meter Fixing, Index Reading, Stove Fixing, House Fitting (Compo. or Iron). Total Abstainer.
Address A. B., 165, St. Leonard Street, BROMLEY-BY-BOW, E.

GAS Engineer, accustomed to construction of new Works, and remodelling and carrying on existing Works, wishes for EMPLOYMENT. Excellent References.
Address No. 2945, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS AND MANUFACTURERS.

GENTLEMAN, with extensive experience in Gas Engineer's and Manufacturer's Office, and accustomed to Travel, is open to ENGAGEMENT. Could introduce first-class connection among Gas Companies.
Address No. 2926, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Distributing Engineer or District Superintendent seeks RE-ENGAGEMENT. Experienced Man, capable of taking entire charge of large District—Mains and Services, Gas-Cookers, Gas-Fires, Bath-Heaters, Slot Meters, Incandescent and other Lighting, &c.
Address No. 2936, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-FITTER AND PLUMBER.

WANTED, a good General Fitter for outside and indoor work.
Apply to T. JOHN, Superintendent, Gas and Water Works, Urban District Council, MILFORD HAVEN.

RAUNDS GASLIGHT AND COKE COMPANY, RAUNDS, NEAR THRAPSTONE.

WANTED, immediately, a Good Gas STOKER. Wages 22s. a week.
Apply, on or before Nov. 4, to Mr. E. J. WHITNEY, Secretary.

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see p. 971.]

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

NEW GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

LLEWELLYN JONES & T. B. YOUNGER, CONSULTING ENGINEERS, VALUERS, &c., CHESTERFIELD HOUSE, 98, GREAT TOWER STREET, E.C.

IMPORTANT.

OLD Retorts made equal to new by repairing them with CROWTHER'S PATENT STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Can be used in Hot or Cold Retorts; and "A1." for Mouthpiece Joints. Satisfaction Guaranteed.
CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

PUPIL WANTED.

A VACANCY for a Young Gentleman in the Engineering and other Departments of a Water-Works, in the Home Counties. Term Four Years. Premium.
Apply, by letter, to No. 2940, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS MANAGER WANTED.

THE Directors of the Carlow Gas Company will, on Friday, the 5th of November next, at Eleven o'clock, proceed to appoint a qualified GAS MANAGER, at a Salary of £80 a year, with Residence, Fuel, and Light.
Applications and Testimonials to be sent to the Secretary.
EAMES ROGERS,
Secretary.

WANTED, a Gas Manager and SECRETARY. One thoroughly conversant with the Manufacture and Distribution of Gas, and capable of taking the entire charge of the Works. A thorough knowledge of, and experience in keeping Gas Accounts indispensable. Salary, £200 per annum, and progressive according to results.
Applications, stating Age, Experience, &c., with Testimonials, to be sent to the CHAIRMAN and DIRECTORS of the Llanelly Gaslight Company, LLANELLY.

MANCHESTER CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive APPLICATIONS for the appointment of RESIDENT FOREMAN of their Rochdale Road Station.
Applicants must be under 45 years of age, and possess a thoroughly practical knowledge of the Manufacture of Gas, including the use of Stoking Machinery and Regenerative Furnaces.
Salary, £150 per annum, with House, Coal, and Gas.
Applications, stating Age and Experience, with References, and not more than three recent Testimonials, to be delivered at the Gas Offices, Town Hall, Manchester, not later than Ten a.m., on Monday, the 15th of November, 1897, addressed to the Chairman of the Gas Committee, and endorsed "Resident Foreman."
By order,
WM. HENRY TALBOT,
Town Clerk.
Town Hall, Manchester,
Oct. 29, 1897.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

BLUE PRINTS of all kinds in any weather. Drawings and Tracings promptly executed.
J. L. FEATHERSTONE, 21, Old Queen Street, WESTMINSTER, S.W.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

TO GAS AND WATER OFFICIALS.

DON'T forget to Order your 1898 Cycle from the MELROSE CYCLE COMPANY, COVENTRY.

MAIN AND SERVICE LAYER.

WANTED, a good steady Man as Main and SERVICE LAYER. Preference given to one who has also had experience of inside fitting work.
Apply to the MANAGER, Gas-Works, ROTHERHAM.

IRTHLINGBOROUGH GAS AND COKE COMPANY, LIMITED.

WANTED, by the above Company, a thoroughly competent GAS-FITTER and MAIN and SERVICE LAYER.
Apply, stating Age and Wages required, with References, to J. T. LEWIS, Gas-Works, WELLINGBOROUGH.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BAIRMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

GASHOLDER Wanted, from 5000 to 10,000 Cubic Feet (second-hand), with or without self-contained Tank.
State Particulars and Price, and if can deliver and fix at Gloucester, to No. 2946, care of Mr. King 11, Bolt Court, FLEET STREET, E.C.

RAMSGATE CORPORATION.
(WATER DEPARTMENT.)

FOR SALE—Two Cornish Boilers, 26 ft. long by 5 ft. diameter, inside Tube 2 ft. 9 in., with certain Fittings.
Tenders to be sent in on or before Noon on Monday, Nov. 15, 1897, addressed to the Chairman of the Gas and Water Accounts Committee, Hardres Street, and endorsed "Tender for Boilers."
Further Particulars on application to William A. Valon, Engineer.
The Committee do not bind themselves to accept the highest or any tender.
W. A. HUBBARD,
Town Clerk.

SULPHURIC Acid for Sale B.O.V. and R.O.V. made from Sulphur. Inquiries solicited.
J. HARDMAN, Chemical Works, Milton and Tunstall, STAFFS.

FOR SALE—300 14-in. Street-Lanterns, with Cradles, in good condition. Reasonable offers will be considered.
Apply to the ENGINEER and MANAGER, Brentford Gas Company, High Street, BRENTFORD.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.
Apply, by letter, to No. 2978, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE — A Modern Sulphate of AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 5000 to 6000 lbs. of Sulphate per day.
For further Particulars, apply to the BRYMBO STEEL COMPANY, LIMITED, near WREXHAM.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

GAS-GENERATING APPARATUS PATENT FOR SALE.

THE Owner of the English Patent for the FEIL GAS-GENERATING APPARATUS is desirous of SELLING IT.
Offers to be addressed to No. 2944, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COMBINED Vertical Steam-Engine and GAS EXHAUSTER, to pass up to 5000 Cubic Feet per hour, with 5-inch Valves, Governor, Bye-Pass, Stone Base, &c., complete, £45; VERTICAL BOILER, £25 extra. 7000 Cubic Feet per hour EXHAUSTER, with 6-inch Valves, two three-speed Cones, £35. One-Horse Power GAS-ENGINE, £34.
Address No. 2943, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Chester United Gas Company have FOR SALE the following disused PLANT:—
One 16-inch WECK VALVE for two Purifiers, with Centre Bye-Pass.
One 16-inch LAIDLAW FOUR-WAY BYE-PASS VALVE.
One 16-ton Dr. FELDMANN'S SULPHATE PLANT, manufactured by Goddard and Massey.
Offers to be sent to Mr. ROBT. HUNTER, Engineer, Gas-Works, Roodee, CHESTER.

BOROUGH OF RICHMOND (SURREY).

BOILERS AND PUMPS FOR SALE.

THE Water Committee of the Town Council of this Borough will shortly be fixing more powerful Steam-Boilers and Direct-Acting Steam-Pumps at their Water Lane Works, and invite TENDERS for the purchase of the BOILERS now in use thereat, when displaced, and the STEAM-PUMPS when No. 1 new Pump is fixed—viz.—
(1) A "CORNISH" type PUMPING-ENGINE, Compound with Surface Condenser, on Stone Bed, complete with Suction-Pipe, 8 inches diameter, and Foot Valve. Dimensions of Cylinders: Steam, 12 in. by 21 in. by 36 in.; Pump, 9 in. by 36 in., with Gun-Metal Liner and Piston for Cup Leathers, with independent Air-Pump (Evan's Globe pattern), and Pipe Connections to Pump, including Hydraulic Regulator on Steam-Pipe, Starting-Valve and Steam-Pipe up to the first bend, also one 6-inch flanged Bend on delivery end Condenser; Harding's Patent Counter, Shafting, Rods and Cranks, and Vacuum Gauge.
(2) An "EXCELSIOR" PUMP, Single Cylinder, Direct-Acting, on Cast-Iron Bed-Plate, with Steam Valve and Pipe to first Bend, Air-Vessel, Counter and Pressure-Gauge, with 6-inch Suction-Pipe and Foot-Valve. Dimensions of Steam Cylinder, 10 in. by 18-in. Stroke. Pump, 5½ in. by 18-in. Stroke. Gun-Metal Liner and Piston for Cup Leathers. The 6-inch Delivery-Pipe not included in Sale.
(3) Two Vertical STEAM-BOILERS ("A" and "B"), Fields' patent, 13 ft. high by 6 ft. 6 in. diameter, 226 Tubes, Central Uptake, with Iron Chimneys about 45 ft. high by 20 in. diameter, two Safety-Valves 2¾-inch, Water-Gauges, one 2-inch Scum Cock, two 2-inch Blow-out Cocks to each Boiler. These are all Durances' asbestos packed, and in good order. Boiler "A" is now working at a pressure of 45 lbs. to the square inch, and Boiler "B" at 60 lbs.; both under certificates of the Vulcan Boiler Insurance Company, Limited.
Both Pumps have been kept in good working condition, and can be seen in use between Nine a.m. and Five p.m. daily on application to the Borough Water-Works Engineer, Mr. W. G. Peirce, Borough Water-Works Office, Riverside, Richmond, from whom Forms of Tender and Conditions of Sale may be obtained.
The Council do not bind themselves to accept the highest or any tender.
Tenders, marked "Tender for Steam-Boilers" or "Steam-Pumps" (as the case may be), must be delivered at my Office before Four p.m. on Tuesday, the 23rd of November, 1897.
FREDK. B. SENIOR, Town Clerk.
Town Hall, Richmond, Oct. 29, 1897.

PATENT FOR SALE.

THE Inventor of a Retort-Lid Fastening, which is well spoken of, and has met with a considerable measure of success, is anxious to dispose of his PATENT RIGHTS to a Firm of Manufacturers, or other Capitalists, for a Sum down or by Instalments, as may be agreed.
Full Particulars will be sent on application, by letter, to No. 2927, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for COKE ELEVATOR, BREAKER, &c.
A general Specification and further Particulars may be obtained upon application to the Gas Manager, Mr. W. Whatmough, to whom Designs and Specifications should be sent not later than Wednesday, Nov. 10, 1897.
Contractors tendering for this work must pay their workpeople at least the Standard or Trade Union Rate of Wages, and observe the Trade Conditions which attach to the various kinds of work for which the tender is sent in.
Sealed tenders, endorsed "Coke-Breaking Apparatus," to be sent to me not later than Tuesday, the 16th of November, 1897.
(Signed) J. H. BALDWICK, Town Clerk.
Municipal Buildings, Heywood, Oct. 20, 1897.

BOROUGH OF BURTON-UPON-TRENT.

FIRE-CLAY GOODS.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, invite TENDERS for the supply of the FIRE-CLAY RETORTS, BRICKS, and CLAY required at the Gas-Works during the Year 1898.
Full Particulars of the Specification and Conditions, with Form of Tender, may be obtained on application to the undersigned, to whom sealed tenders, endorsed "Fire-Clay Goods," must be delivered on or before Thursday, the 25th day of November inst.
The lowest or any tender will not necessarily be accepted.
F. L. RAMSDEN, Manager and Engineer.
Gas and Electric Light Works, Burton-upon-Trent, Nov. 1, 1897.

THE BRISTOL GAS COMPANY.

IMPORTANT ISSUE OF GENERAL CAPITAL STOCK AND NEW DEBENTURE STOCK.

GEO. NICHOLS, SMITH, & ALDER are instructed to SELL BY PUBLIC AUCTION, at their Sale Rooms, 49, Broad Street, Bristol, on Thursday, the 18th day of November, 1897, at Two p.m. precisely,
IN LOTS OF £100 EACH,
£20,000
FIVE PER CENT. MAXIMUM GENERAL CAPITAL STOCK
AND
£5000
NEW DEBENTURE STOCK
(Bearing Interest at the rate of 4 per cent. per annum, payable half-yearly in June and December),
OF AND IN
THE BRISTOL GAS COMPANY,
Issued by the Company under their Statutory Powers.
The Stock will be Sold and Registered in the Books of the Company *Free of every Expense* to Purchasers thereof.
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ANALYSIS OF THE ACCOUNTS

OF THE

METROPOLITAN WATER COMPANIES,

Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, and West Middlesex—showing the Capital, Income, Expenditure, Profits, and Dividends per Million and per Thousand Gallons of Water supplied; the proportion of Expenditure and Profits to Gross Income; and the Income, Expenditure, and Profits per House, &c., supplied for the Year ended Dec. 31, 1896, or March 31, 1897, together with the Quantity of Water supplied, the estimated Daily Quantity supplied for Domestic and other Purposes, the Quantity supplied per Head of Population, &c., &c., for the Year ended Dec. 31, 1896.

Compiled and arranged by

ALFRED LASS, F.C.A.

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TO GAS EXAMINERS AND ANALYSTS.

A COURSE of about Twenty Lectures and DEMONSTRATIONS on the MANIPULATION of GASES will be conducted by Mr. MORRIS W. TRAVERS, B.Sc., under the direction of Professor W. RAMSAY, F.R.S., at University College, Gower Street, W.C., at 5.30 p.m. on Fridays, commencing Nov. 12.
The Lectures will treat of hitherto unpublished Researches which have led to new Processes for the Manipulation of Gases, of great importance to Gas Examiners and others engaged in the Analysis or Treatment of Gases. The hour has been fixed to meet the convenience of persons engaged in Public Laboratories during the day.
The Fee for the course is £1 1s.; but the Technical Education Board have the right of nominating a limited number of Free Students whose circumstances are such that, in the opinion of the Board, they are unable to pay the Fee.
Application for admission to the Classes should be made *at once*, either to Professor Ramsay, at University College, or to the undersigned.
WM. GARNETT, Secretary of the Technical Education Board.
9A, St. Martin's Place, W.C.

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Ash . . . . . Under 1 Per Cent.
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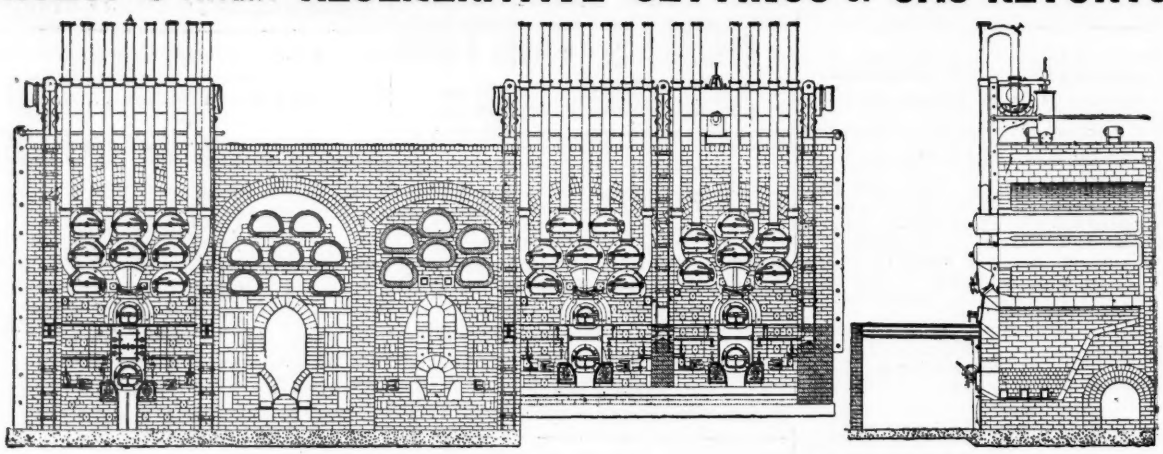

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THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

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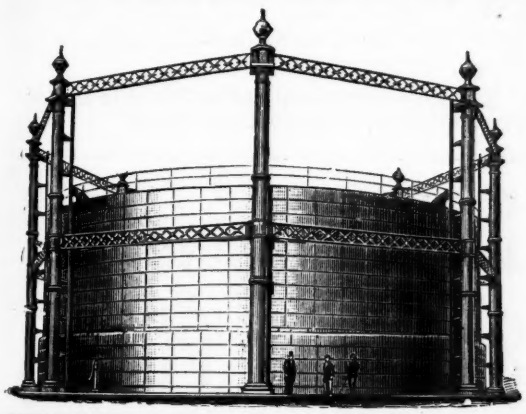

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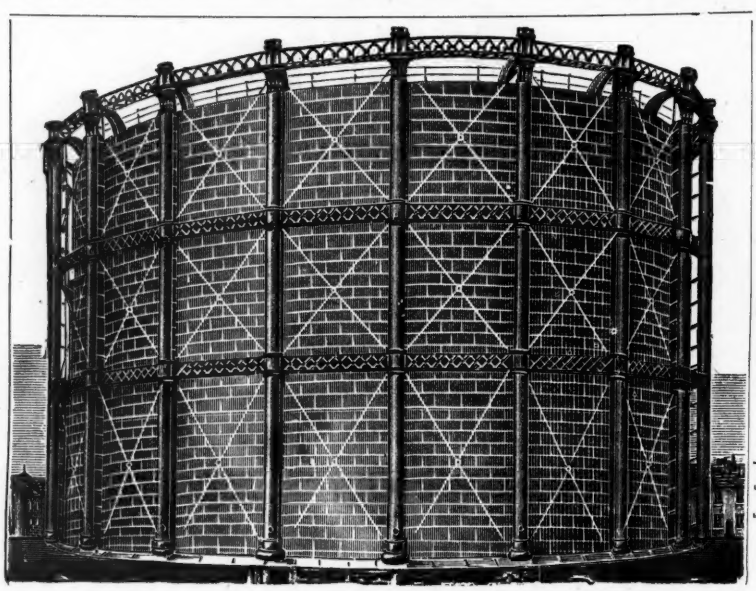

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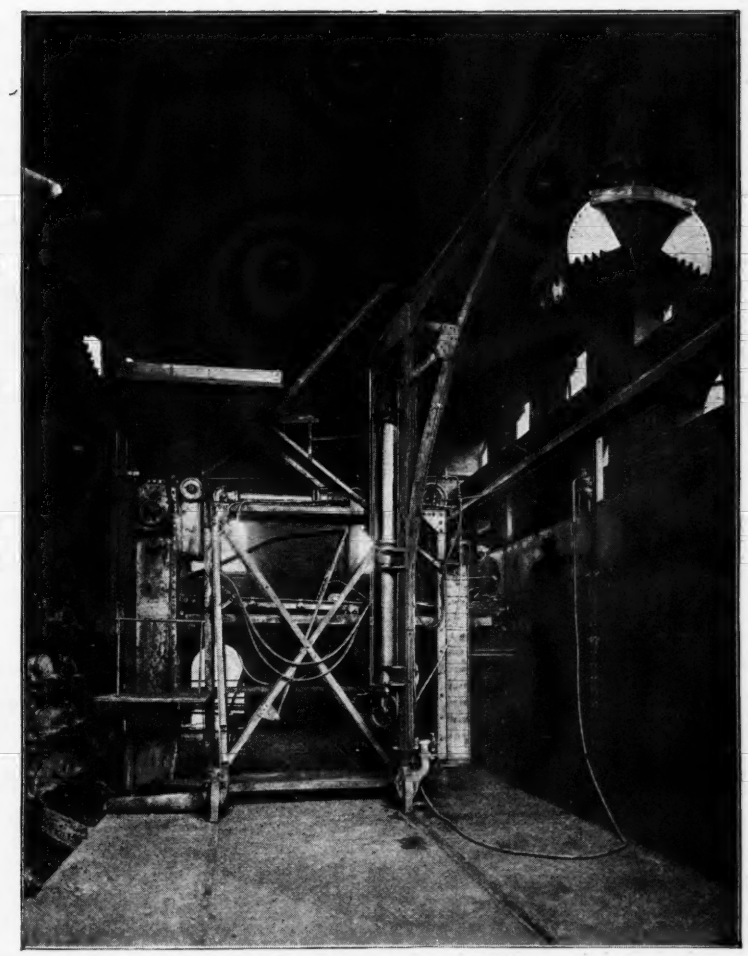

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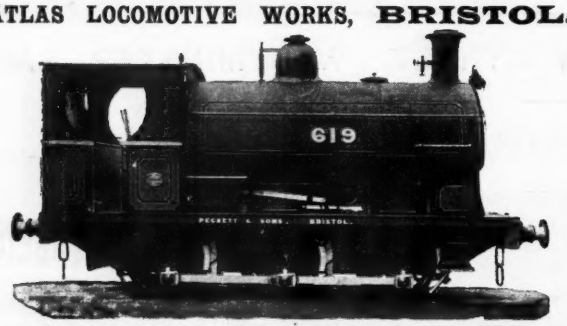

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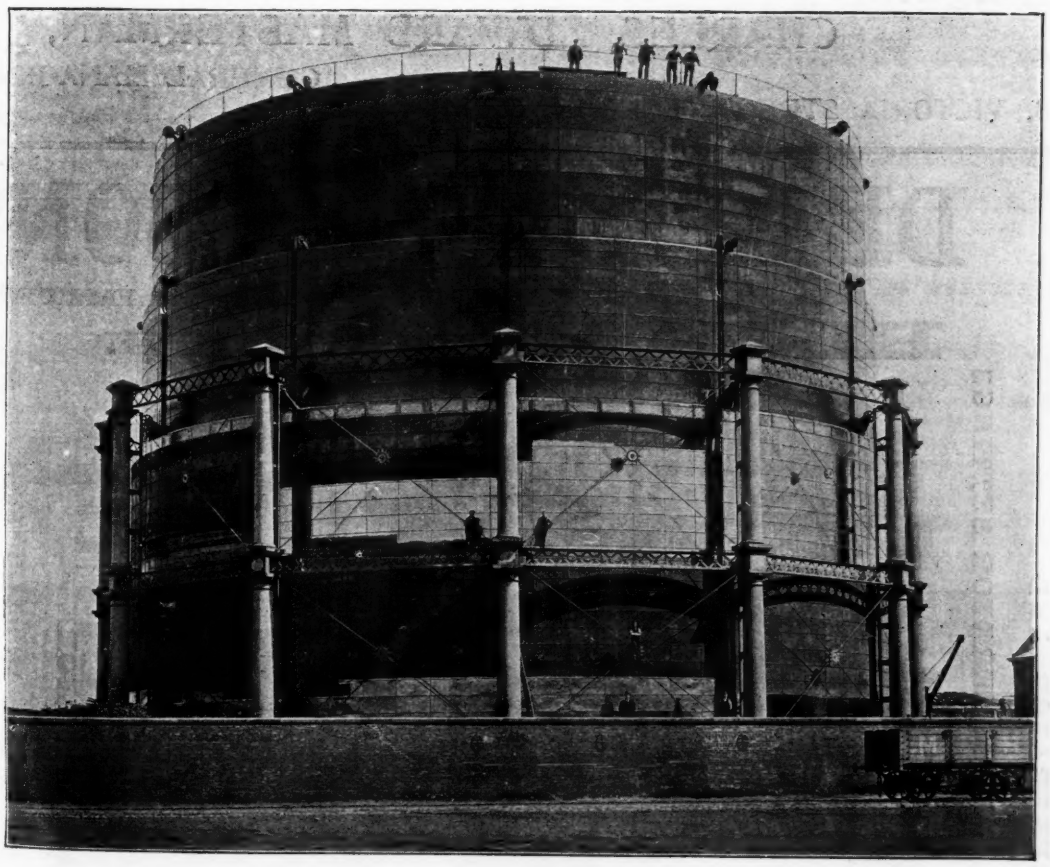

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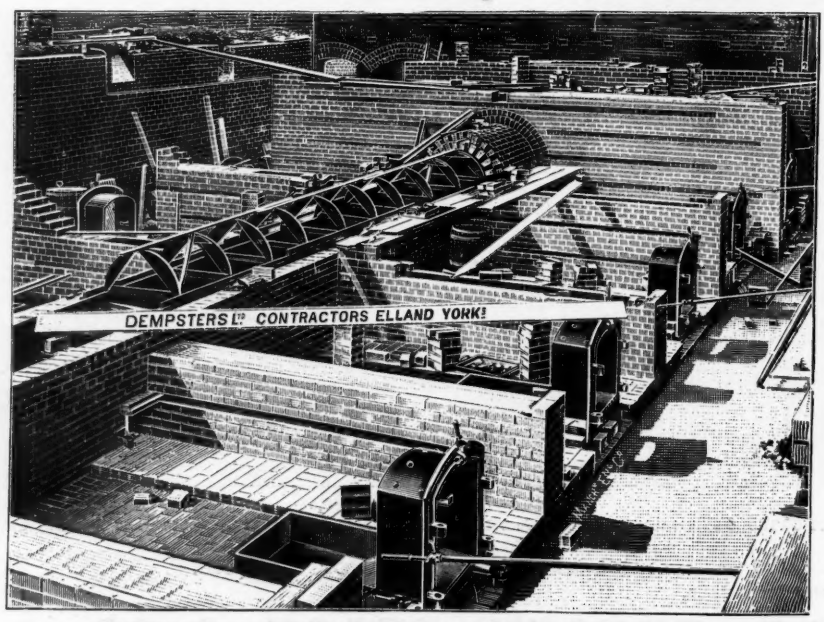

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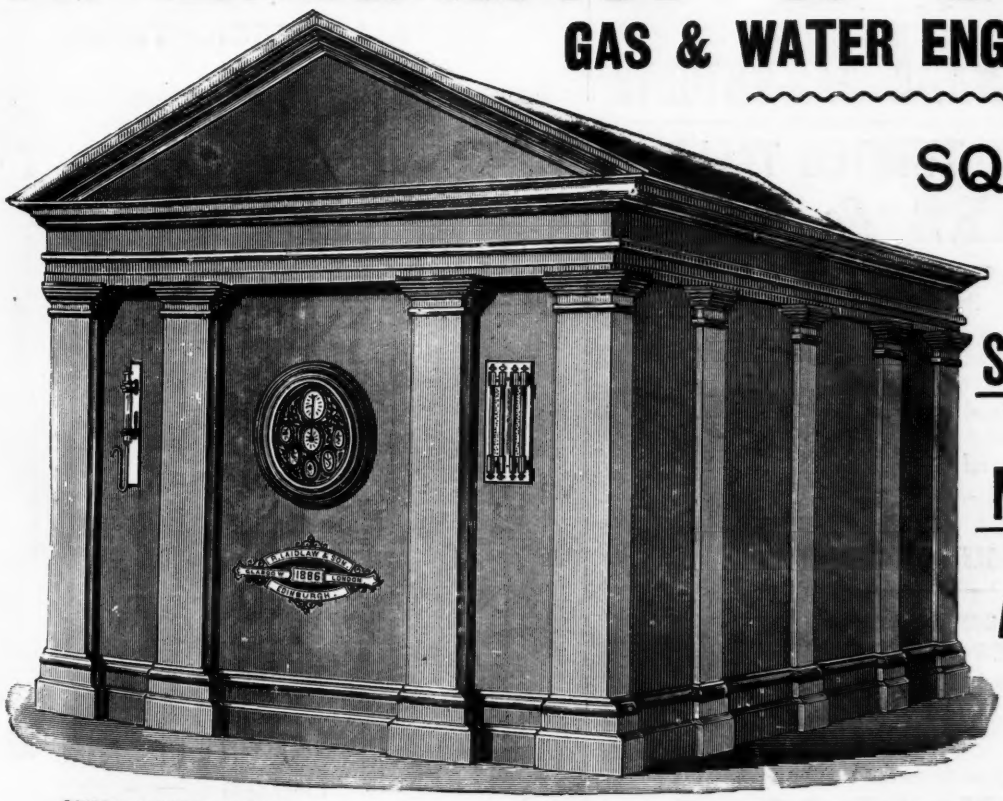

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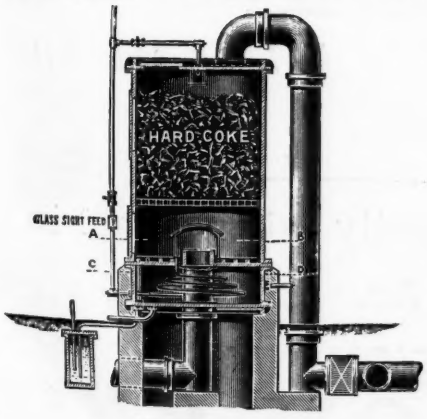

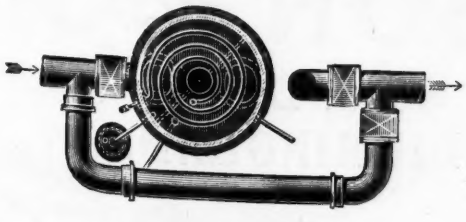

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[See also Advt. p. 938.

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